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# Machine Shop

September, 1930

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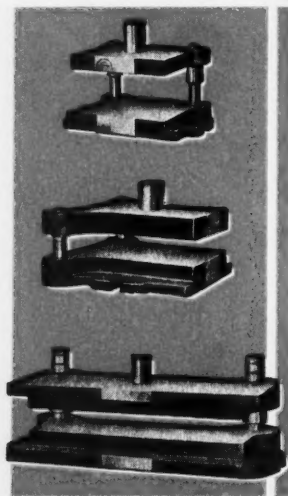
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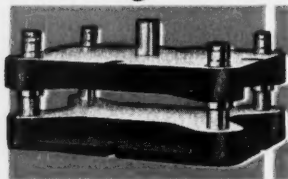


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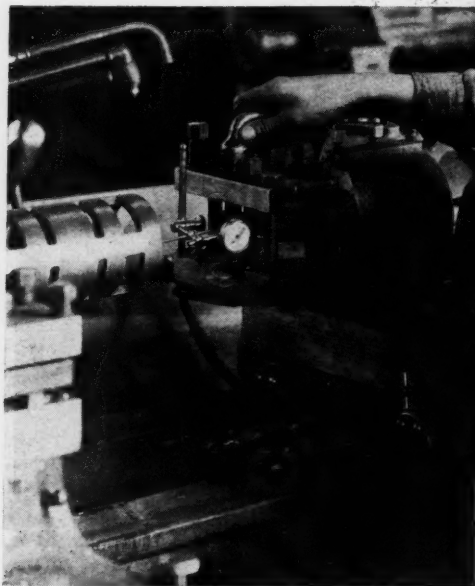
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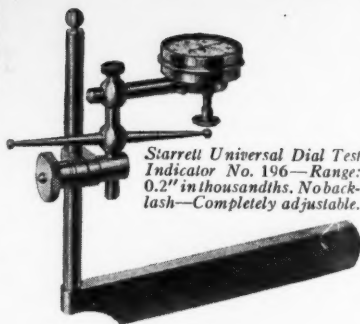
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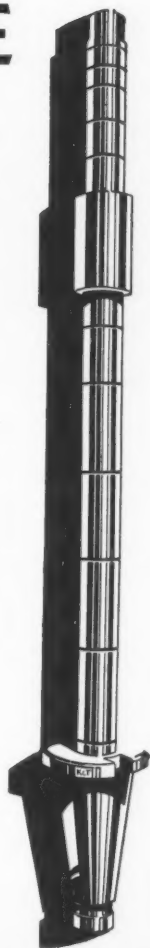
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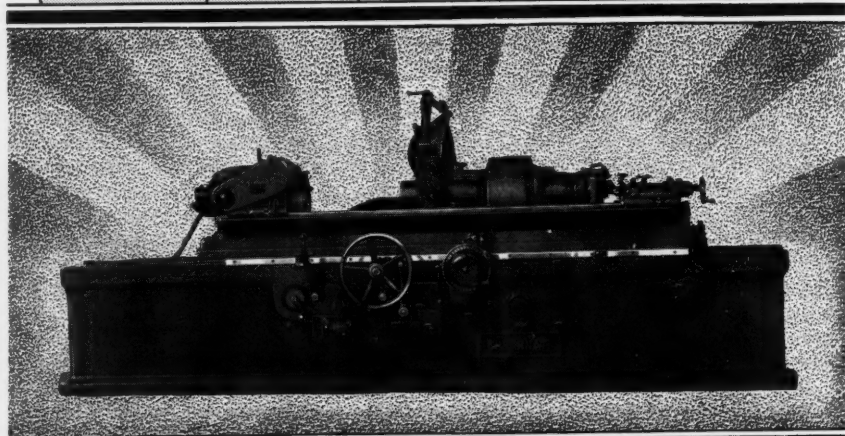
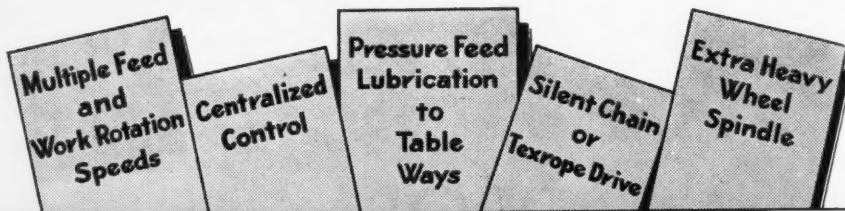
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CINCINNATI  
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# A Brown & Sharpe No. 3 saves money by keeping your cutters sharp

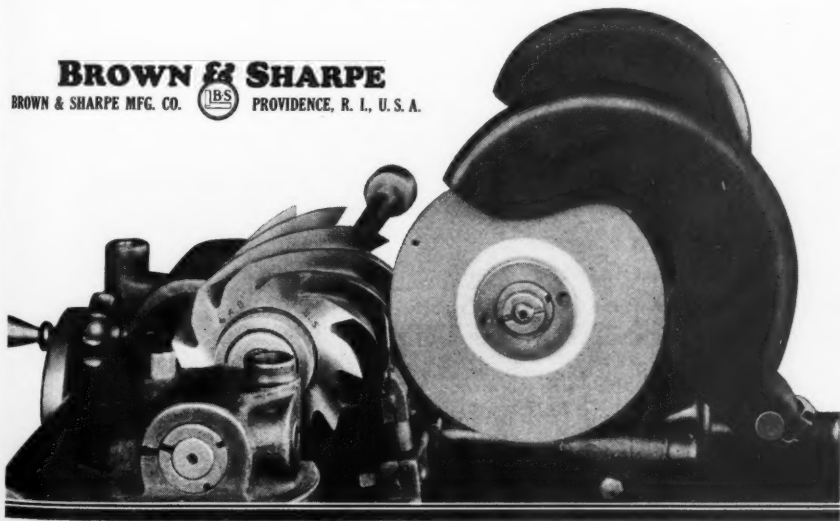
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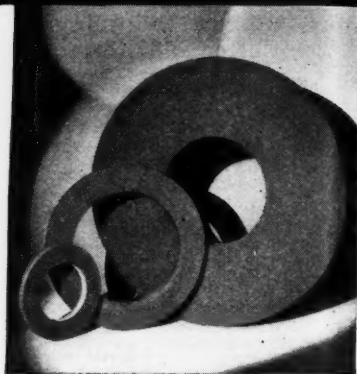
### 1. More Exact Selection of Wheels 2. Closer Duplication of Wheels

**N**ORTON Controlled Structure is a real achievement—a real step ahead in grinding wheel manufacture. Regulating as it does the fifth variable\* it makes possible the fitting of wheels to their job and the duplication of wheels with an exactness far greater than ever before attainable. These two features are of the utmost importance in modern high production, high precision grinding—such as crankshaft and centerless.

In controlled structure wheels not only the grain size and grade (bond strength) are regulated but also the size and number of the openings or pores between the grains. To do this it is necessary to control most accurately the amount of abrasive and of bond per unit volume. How carefully this is done can be appreciated from the fact that the variation in unit weight of Norton Controlled Structure Wheels is held within *one per cent*.

\*The five variables are abrasive, bond, grain, grade, and STRUCTURE.

NORTON COMPANY, WORCESTER, MASS.



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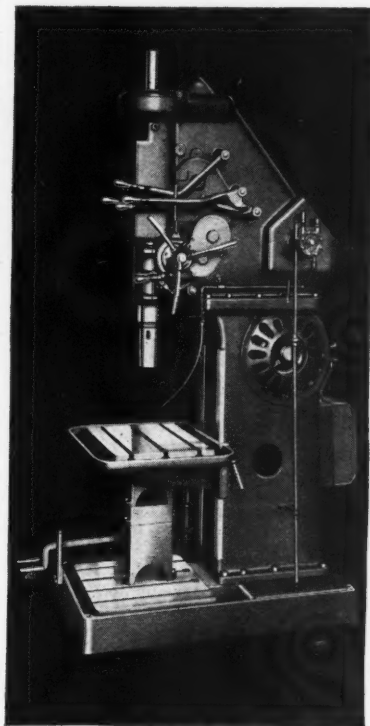
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More than twenty years invaluable experience in designing, building and following into commercial service thousands of Self-Oiling, All-Geared Drills, including about 500 No. 242's, has given us a comprehensive understanding of modern drilling requirements. This has been incorporated in the new No. 242 Self-Oiling, All-Geared drill illustrated. This machine is bigger, heavier and more powerful than its predecessor. It represents the most modern practice in machine-tool design and has new and exclusive features which increase production and reduce operating costs.



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## BARNES DRILL CO.

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Multiple disc clutches, our own time-tested construction, for easy, positive driving; and automatic band brake for quick stopping of spindle.

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Enclosed spindle construction excludes chips and grit and becomes part of Self-Oiling System. All spindle bearings now oiled continuously and automatically.

Coolant pump directly connected to drive shaft by sliding clutch.

Gunit cap on spindle sleeve bearing for take up and easy assembling.

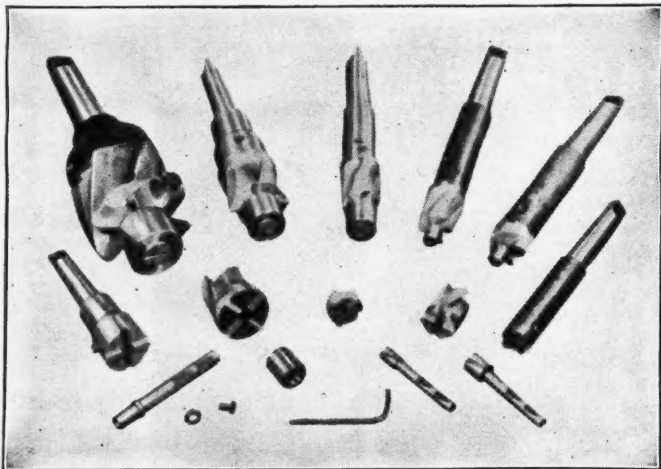
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Interchangeable Counterbore and Spot-facer



Patent Pending

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The  
"Sterling"  
MARK OF QUALITY IN  
Cutting  
Tools



# MODERN Machine Shop

REG. U. S. PAT. OFF.

*A Magazine for Machine Shop Executives*

HOWARD CAMPBELL, Editor

Vol. 3

SEPTEMBER, 1930

No. 4

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*ARMSTRONG Tool Holders are used in over 96% of the Machine Shops and Tool Rooms*



## "ARMSTRONG Tool Holders fill a position all their own."

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"I am one of the old boys, and I readily recall the first ARMSTRONG Tool Holders that entered the Rand Drill Plant, which is now part of the Ingersoll-Rand Co., while I was working there as a tool maker, and I can safely say that the ARMSTRONG Tool Holders, from that day to this, have filled a position all of their own in Machine Shops and Tool Rooms. I personally wonder how some of the men of today would get along if they had to go back to days of going out to the blacksmiths and trying to coax the old blacksmith into forming a tool to meet their needs, and if their experience at that time would have been the same as mine, where I often had to take hold of the swedge and at other times strike for him, so as to coax him into the humor of forming a tool for me.

"The ARMSTRONG Tool Holders eliminated all of this trouble, because it was only a short time before all of us had a series of bits formed the way we wanted them and we were always ready to take care of the jobs. I am absolutely sure that your slogan of 'Save all Forging, 70 Percent Grinding and 90 Percent High Speed Steel' still holds good."

### ARMSTRONG BROS. TOOL CO.

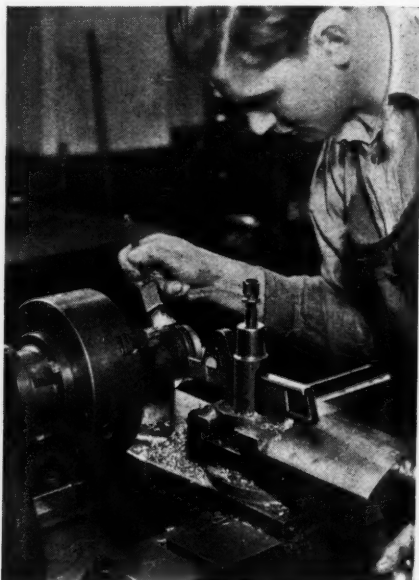
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328 N. Francisco Ave.

Chicago, U. S. A.



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Write for Catalog B-27  
Shows, describes and prices all  
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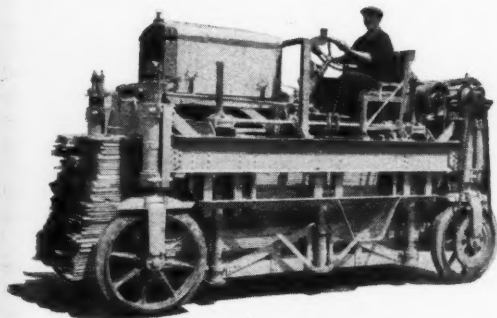
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# MODERN Machine Shop

SEPTEMBER, 1930

CINCINNATI, OHIO

VOL. 3, No. 4



## Building the Original "Straddle- Truck"

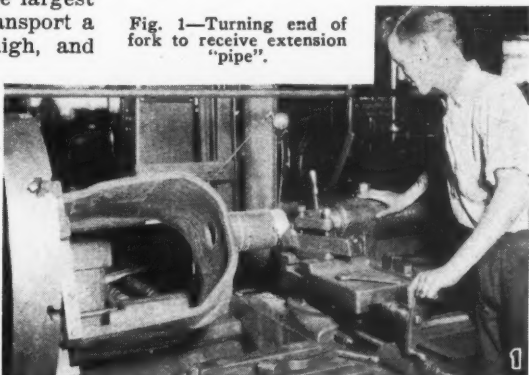
By PHILIP WINTER

TO ONE who is not familiar with the most modern methods of handling lumber, steel beams, pipe sections, or other long materials, the manner in which a Ross Carrier slides into place over a pile of material, picks it up, and walks off with it, is hardly short of amazing. The Ross Carrier, built by the Ross Carrier Company, Benton Harbor, Michigan, is called the "original straddle-truck." It is built in several sizes, the largest of which will pick up and transport a load 6 ft. wide by 7 ft. high, and weighing up to 10 tons. There is no limit to the length of the load; timbers and steel beams up to 100 ft. long are handled with ease.

The Ross Carrier is a self-propelled vehicle, built on a framework of structural steel, riding on cast steel, rubber-tired wheels, and powered by an internal combustion engine. The

transmission provides six speeds, three forward and three reverse. The load is picked up and carried by swinging lifts which may be swung away from the load as the carrier is maneuvered into place; after the carrier has straddled the load, the lifts are swung into place and locked. The load is then lifted to clear the ground and the carrier moves off with it at a speed of, perhaps, 30 miles per hour.

Fig. 1—Turning end of fork to receive extension "pipe".



The machining of the parts for the Ross Carrier involves several interest-

ing operations. As will be seen by reference to the headpiece, each corner of the carrier is supported by a fork that straddles the wheel, the upper end of the fork being held vertical by a steel barrel to which the corner of the frame is attached. As all forks are of the same dimensions except for the length, the forks are all forged alike and the necessary length is provided for by the addition of an extra section, or "pipe." The pipe may be of any required length, from 36 in. to 72 in. long.

To prepare the fork for the pipe, the end is turned, as shown in Fig. 1, to a dimension which is a few thousandths of an inch

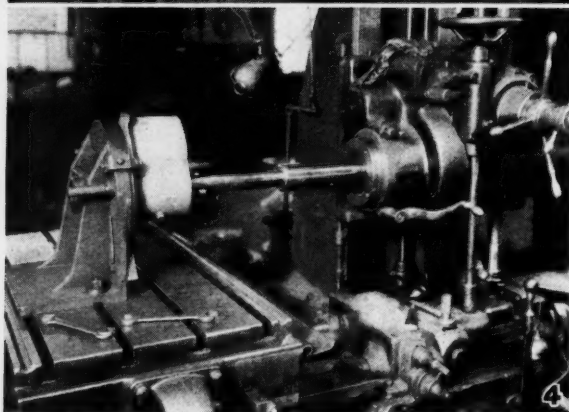
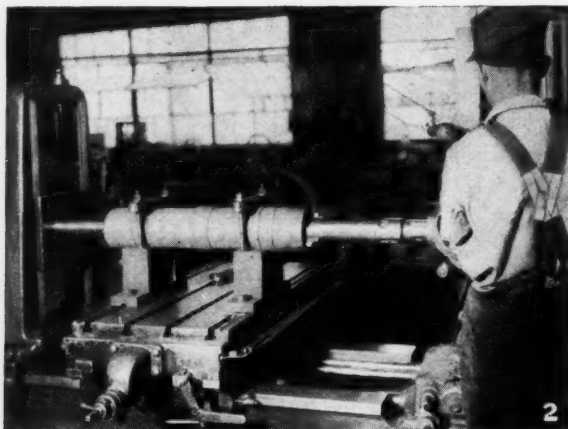
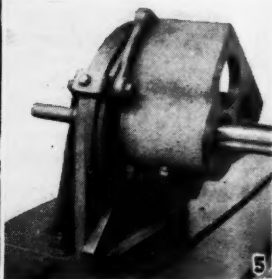


Fig. 2.—Boring the barrel for the fork. The boring tool is followed with an inserted-tooth, adjustable reamer. Fig. 3—Milling sides and tops of hub caps. The 24 pieces are finished in 35 minutes. Fig. 4—Boring three holes for ball bearings in a reverse gear case. Fig. 5—By revolving the work-plate, each of the three holes in succession is brought into line with the boring bar. Exact location is obtained by means of a plug that fits into a steel bushing.



larger than the inside diameter of the pipe. When ready to assemble, the pipe is heated enough to expand it ap-

springing of the work in clamping, the pressure on the clamps is released before the reaming operation is performed. The bore is finished with an inserted-tooth, adjustable reamer, the finish dimension being  $5.500 + .010$  in. The barrel shown in process is  $26\frac{1}{2}$  in. long; the longest, however, are  $58\frac{1}{2}$  in. long.

Fig. 3 shows the operation of milling the sides and tops of hub caps, for which a planer-type miller and combination inserted-tooth cutters are used. The caps, which are of drop forged steel, are clamped in a fixture which holds 24 pieces. The 24 pieces are finished in 35 minutes.

The horizontal boring machine shown in Fig. 4 is set up to bore three holes for

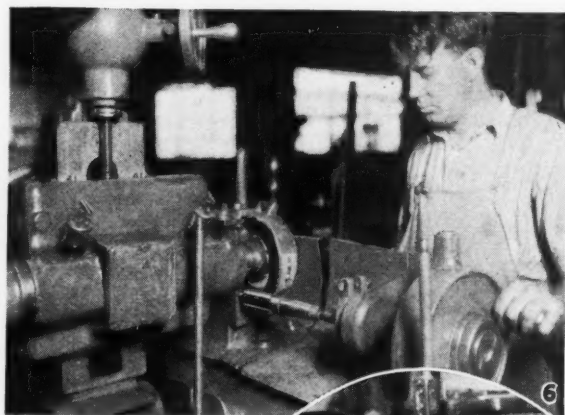
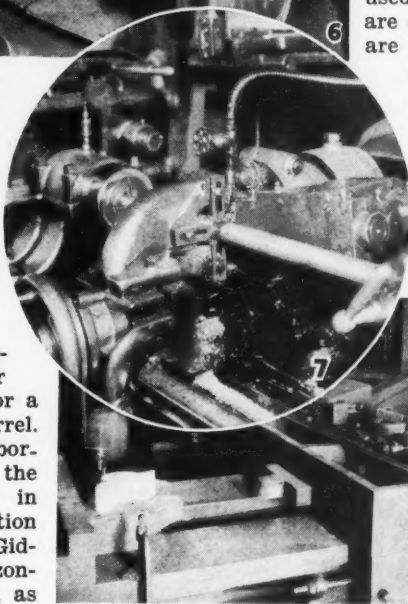


Fig. 6—Grinding the splines on a transmission shaft. Fig. 7—Milling a  $1/3$  P. double thread on a hoist shaft. Fig. 8—Horizontal forging machine, set up to form the "hook clamp" shown on the machine.

proximately  $1/64$  in., then it is slipped into place and welded at the joint. When cold, it is returned to a diameter of  $5.375 + .004$  in. for a sliding fit in the barrel.

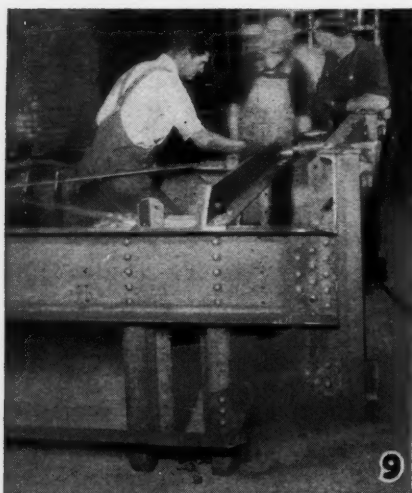
The operation of boring the barrel for the fork is illustrated in Fig. 2. This operation is performed in a Giddings & Lewis horizontal boring machine, as shown, the work being clamped in a pair of V-blocks which are bolted to the machine-table. The piece is first rough bored with a double-end cutter, removing all stock excepting .015 in. which is left for reaming. In order to eliminate any difficulties which might arise from the

ball bearings in the reverse gear case. As this operation is held to close limits, a fixture is used with which the dimensions between the centers can be held to the drawing limits of  $+.0015$  in. The tool is a single-end cutter, held in a piloted bar. The work



is clamped to a plate, Fig. 5, which is designed so that it can be revolved to bring any one of the three holes in line with the bar. The location is obtained by means of a plug which slides in a hardened and ground steel bushing in the frame of the fixture, and which fits into a similar bushing in the work-plate. No allowance is made on the dimensions of these holes; when finished, each hole must be a push fit for the ball bearing.

In Fig. 8 an operator is shown



9

grinding the splines of a 4-spline transmission shaft, using a universal grinder. The diameter of the shaft is held to 1.625, and the width of each spline is held to .500—.0005 in., all of which is accomplished with a wheel that is dressed to obtain the desired shape and size.

The most important part of the mechanism with which the load is lifted, when the Ross Carrier is in operation, is a hoist-shaft, or screw, carrying a double thread. In Fig. 7 is shown the operation of cutting the thread—which is  $1/3$  P.—on a shaft that is  $1\frac{1}{2}$  in. diameter and 24 in. long. The thread is milled with a thread milling cutter in a Lees-Bardner thread milling machine. This operation is finished, complete, in 14 minutes.

As the construction of the Ross Carrier involves the use of a variety of steel forms and shapes, it is evident that the plant equipment must include a forging machine. Such a

*(Continued on page 24)*

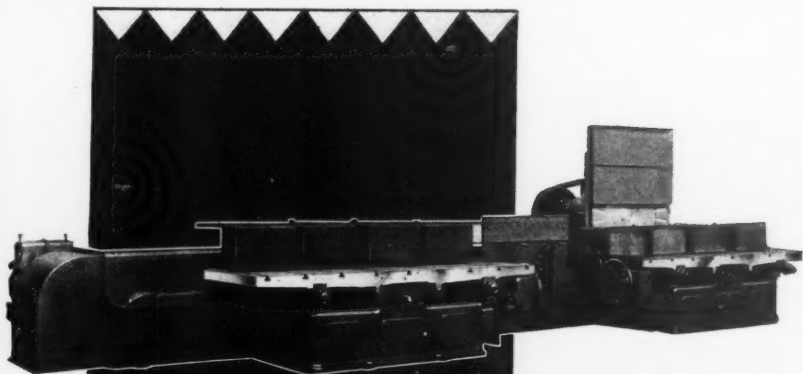
Fig. 9—Each frame contains 880 steel rivets. The rivets are headed with a "Thor" air hammer and buckler.

Fig. 10—View of one side of the final assembly room. The carriers shown in this illustration are being built for export.



10





## PROOF of ability to build SPECIAL-PURPOSE Grinders!

**T**HE mammoth machine illustrated here—a tool 35' long and weighing 35 tons—affords convincing evidence of the ability of Gardner Engineers to design and build SPECIAL-PURPOSE GRINDERS, regardless of how unusual may be the problem to be solved.

Developed especially to grind all six surfaces of large fire brick blocks used in lining glass furnaces, it is not only the largest Disc Grinder ever built, but it is a most effective and productive tool, as well.

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# GARDNER MACHINE COMPANY

*(Specialists in Grinding Equipment)*

428 East Gardner Street

Beloit, Wisconsin, U. S. A.

# Hypoid Gears and Their Application

By R. H. KASPER

**A**LTHOUGH hypoid gears were developed several years ago, their adoption has been rather slow. However, they are now being used quite extensively on automobile final drives,

tions and practices, and the failure to fully grasp the advantages and possibilities of the new type of gearing. The usual "probationary" period has now passed, with increasing popularity of hypoid gearing. Many manufacturers have had exceptional success with hypoids, and unusual installations have been successfully attained. In addition to this, improved methods of manufacture have improved the quality and reduced the cost of hypoid gears.

Hypoid gears are tapered gears, similar in many respects to spiral bevels; both types have curved teeth and are produced by the same method of manufacture. The outstanding difference is that the hypoid pinion axis is offset from the gear axis. Due to this offset, several advantageous characteristics are produced, the most noticeable of which is the size of the

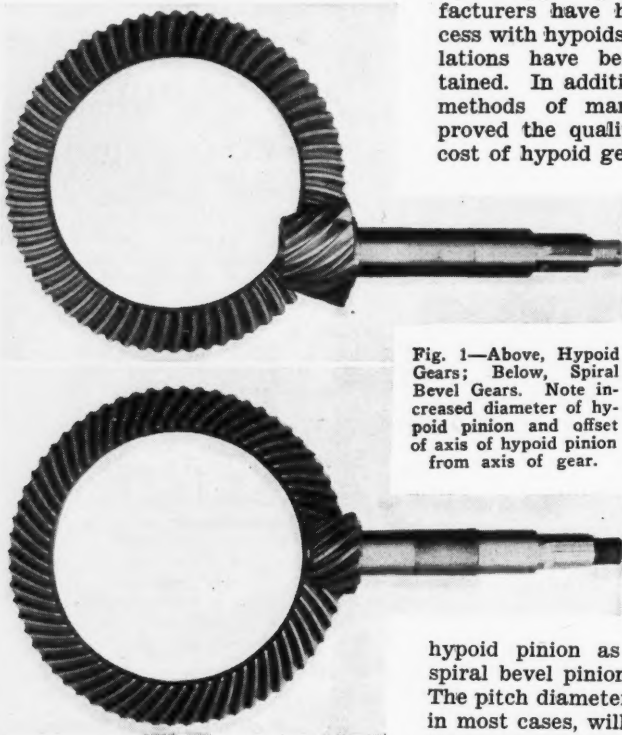


Fig. 1—Above, Hypoid Gears; Below, Spiral Bevel Gears. Note increased diameter of hypoid pinion and offset of axis of hypoid pinion from axis of gear.

hypoid pinion as compared with a spiral bevel pinion of the same ratio. The pitch diameter of a hypoid pinion, in most cases, will be from twenty to thirty per cent greater than a similar bevel pinion, the gear diameters being the same. In some cases, the increase in pinion size will be much greater; for instance, at a 10 to 1 ratio, with a spiral bevel gear of 10

(Continued on page 20)

and are gradually replacing spiral bevel gears on other machines. The tardiness of the machine trade in general in adopting hypoids may be attributed to the indisputable trait of human nature in clinging to old tradi-

(Illustrations courtesy Gleason Gear Works)

## YOU CAN'T MAKE A SILK PURSE OUT OF A SOW'S EAR

SOME chucking equipment is five to ten years old and is frequently pointed to with pride. It should be viewed with alarm and scrapped because in chuck manufacturing great mechanical advances have been made within the past five years. The 1930 chucks have new accuracies, new gripping power, new operative speed, and the new heat treating processes have given them new life and stamina. Air operation, power operation, self-tightening features add new possibilities for doing more work with less effort and better results.

Chuck creators never intended to endow them with life everlasting—world without end. Look to your chucking equipment. Unquestionably some of it needs the axe.

Your own dealer has a man who knows chucks and their mechanical advantages. Ask him about the new 1930 models best adapted to meet your needs.

The **CHUCK MANUFACTURERS of AMERICA**

# SIXTEEN FEATURES

*Make The*

## Cincinnati Hypro-Planer

*A Real Producer!*

*Here they are:*

Selective dial feed to all heads.  
Single turn rail clamping device.  
Instantaneous rail lift.  
Double length enclosed bed.  
Inner guide box table with chip slots.  
Rapid power traverse to all heads.  
Forced lubrication to the vees.  
Pressure lubrication to shaft bearings.  
Spray lubrication to complete gear train.  
Centralized oiling system to entire machine.  
Forged steel rack.  
All steel combination herringbone and spur gear drive.  
Full depth box arch.

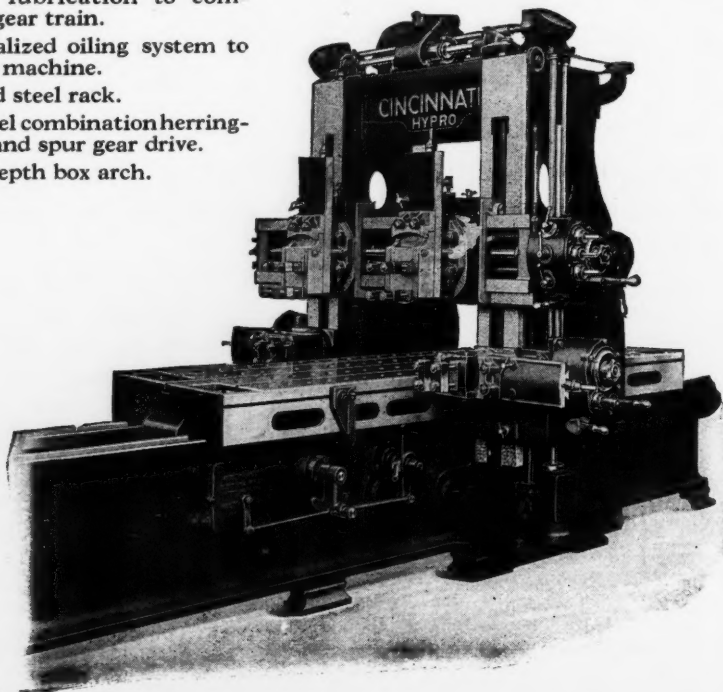
Full bearing slide with inverted dovetail.

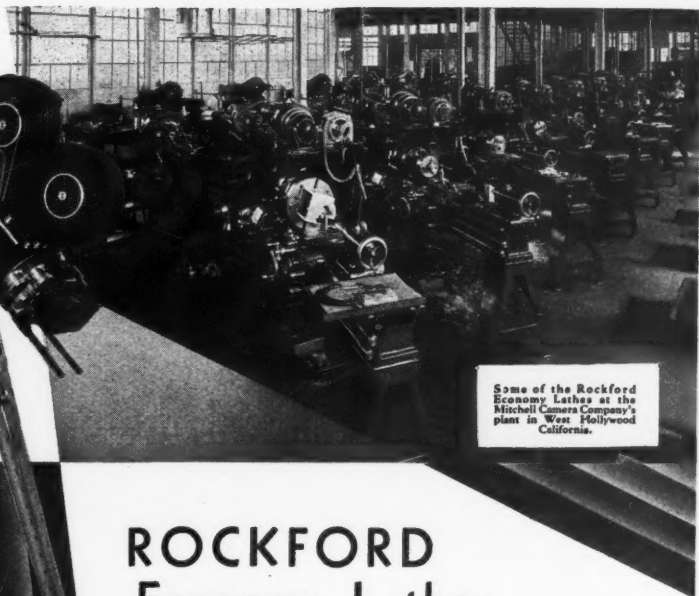
Tool block abutment.

The Cincinnati Hypro-Planer is made in sizes 30" to 120", arranged for either reversing or non-reversing motor drive.

**The Cincinnati Planer Co.**

3100 South Street Cincinnati, Ohio





Some of the Rockford Economy Lathes at the Mitchell Camera Company's plant in West Hollywood California.

## ROCKFORD Economy Lathes Make "Movie" Cameras For the "Talkies"

Ever see a Mitchell motion picture camera? It's a \$4,000 precision instrument requiring the very finest workmanship and machine tools for its production.

If you could visit the Mitchell Camera Company's plant in West Hollywood, where the photograph for the illustration above was taken, you'd see a splendidly equipped shop in which tool-room accuracy prevails. You'd see a large number of Rockford Economy Lathes, used for extremely accurate turning operations on almost every part of the Mitchell motion picture cameras. The reasons for using the Rockford Economy Lathe are the accuracy, speed and convenience of the tool, combined with its price—which is remarkably low for a machine of such high quality. The reason for the large installation here is that repeat orders were placed as a result of the highly satisfactory performance of the first Rockford Economy Lathes purchased. The reasons stated are mighty good ones for the installation of Rockford Economy Lathes in *any* shop for general purpose or high production turning.

Write today for complete description and specifications of Rockford Economy Lathes, and for information about other installations large and small.

### ROCKFORD MACHINE TOOL CO.

2414 KISHWAUKEE STREET, ROCKFORD, ILL.



## Hypoid Gears

(Continued from page 16)

in. pitch diameter and a pinion of 1 in. diameter, the change to hypoids will increase the pinion to  $1\frac{1}{4}$  in. pitch diameter. Figure 1 shows a pair of spiral bevel gears and a pair of hypoid gears of the same ratio and number of teeth. In this case, the increase of pinion diameter is about thirty per cent.

The increase in pinion diameter not only results in added strength of the pinion, but also makes possible a larger

tooth load, averaging from ten to twenty per cent less than for spiral bevels. In present day practice, hypoids and spiral bevels are considered equal in load carrying capacity, though experience has shown that in the average case, it is considerably higher. In extensive tests made under severe conditions, hypoid gears have carried heavy overloads successfully and with an unusual degree of quietness.

In hypoid gears the smooth, rolling action of spiral bevels is combined

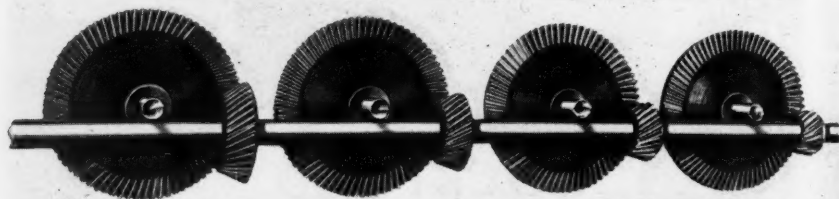


Fig. 2—When hypoid gears are used, the offset pinion permits the shafts to pass each other.

ratio with the same size pinion. This is particularly advantageous in cases where a sacrifice in ratio would be necessary in order to secure strength in the pinion, or to secure a pinion large enough to permit boring. In many cases, where a stem pinion would necessarily be used, with its attendant complications and increased cost, a bored hypoid pinion may be used without any change in ratio. The possibility of using a heavier pinion shaft, resulting in added stiffness, aids materially in preventing a concentrated tooth load—a condition which shortens the life of the gears.

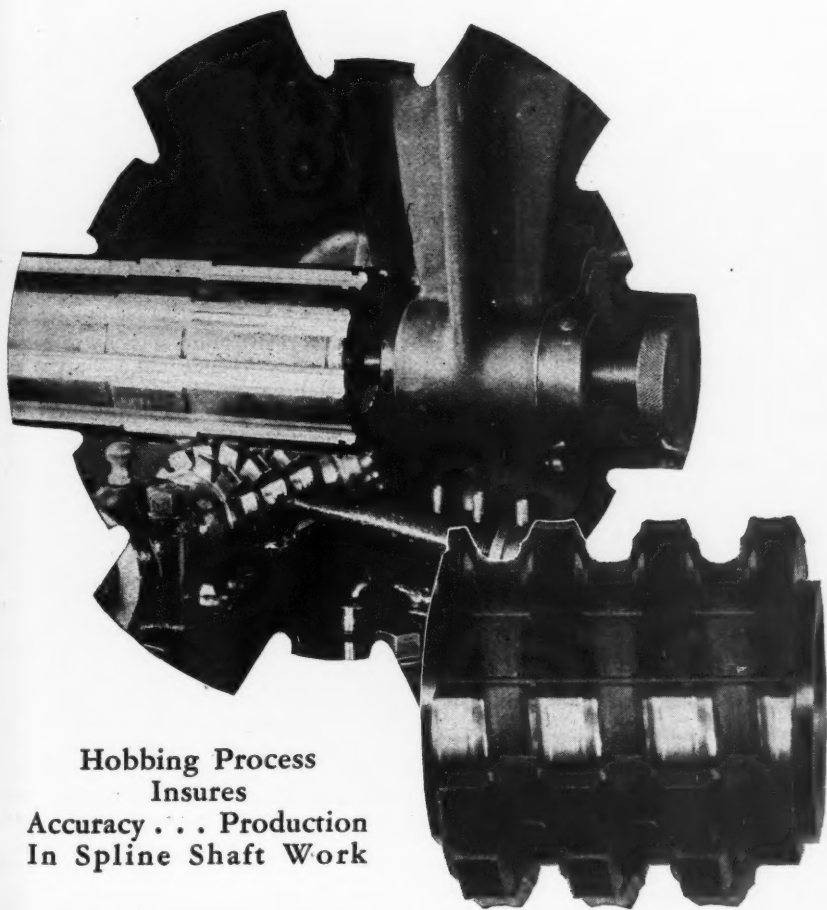
On any pair of gears, the stresses of the tooth surfaces along the lines of contact at the moment of contact are the decisive factors concerning the life and wear of the gears. On hypoid gears, the total tooth load is usually less, and is never greater, than that on spiral bevels. The total tooth load on hypoid pinions is only slightly greater than the tangential

with some of the smooth sliding actions of worm gearing. In the average case, the amount of sliding action is about 25 per cent of the amount which occurs in a worm drive with a 45 degree helix angle, though this additional sliding action is not enough to appreciably increase the wear. Experience has shown that this sliding action has the effect of smoothing down any surface roughness of the teeth, so that the operation becomes smooth after running. This does not occur in spiral bevels, because at the pitch line there is rolling action only, and the smoothing action is absent. On installations where an unusual degree of quietness is desired without the usual period of "running in," as on automobile rear axle drives, hypoid gears can be lapped quite rapidly over the entire tooth surface. The sliding action also tends to maintain an oil film between the tooth surfaces.

Hypoid gears are cut with more



# BARBER-COLMAN GROUND HOBS



Hobbing Process  
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Accuracy . . . Production  
In Spline Shaft Work

## BARBER-COLMAN COMPANY

General Offices and Plant — Rockford, Ill., U. S. A.

spiral on the pinion and less on the gear, as compared with spiral bevels. The angle on the pinion is made 35 or 40 degrees, depending on the number of teeth in the pinion, while the angle of the gear is kept between 5 and 15 degrees. Although this increases the end thrust on the pinion, it also increases the overlap of the teeth, which is one of the beneficial characteristics of spiral bevels. Overlap tends to produce smoother operation. The di-

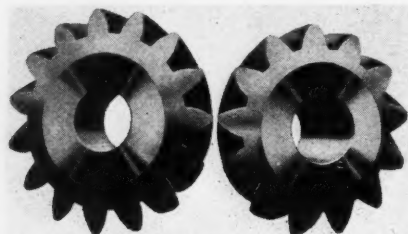


Fig. 3—The curve on one side of the hypoid pinion is flatter than on the other side; this is most noticeable when the center tooth of the hypoid pinion is compared with the center tooth of the spiral bevel pinion.

rection of the offset, whether above or below center, determines the "hand" of the spiral, whether right or left hand. The position should be such that the axial thrust on the pinion is directed away from the gear, so that heavy loads tend to move the pinion out of mesh, rather than draw it in. However, when this condition cannot be met, the objection can be overcome by providing mountings sufficiently rigid to prevent wedging of the pinion.

Probably the most important advantage of hypoid gears, from the viewpoint of application, is that the two shafts can pass each other. This is an impossibility with any other type of bevel gearing, which forces at least one of the shafts to terminate when it reaches the other. With hypoids, any number of pinions may be mounted on the same shaft, while the gear shafts may continue to operate other

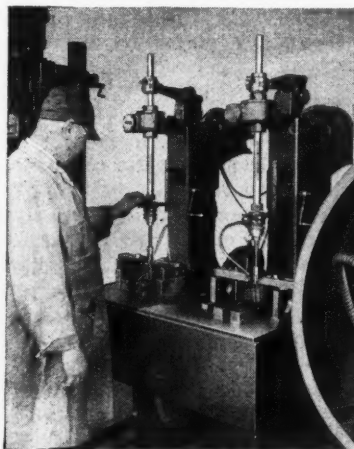
mechanisms. This is strikingly illustrated in Fig. 2. The degree of offset may be selected to suit individual applications, though the maximum offset of the pinion axis from the gear axis should not exceed  $2/5$  of the cone distance.

On plain and spiral bevel gears, the tooth profile is the same on both sides. On hypoid gears, due to the offset of the pinion, an unsymmetrical condition is produced, which requires that the tooth profiles shall also be unsymmetrical. Therefore, one side of the tooth is made with a flatter curve than the other, although the average curve between the two sides will be the same as with other types of bevel gears. In Fig. 3, which shows a spiral bevel and a hypoid, the difference in the profiles can be seen. It is especially noticeable on the two-center teeth. The flatter side of the tooth is usually the driving side, as there is less tendency to deflect the shaft with the flatter curve.

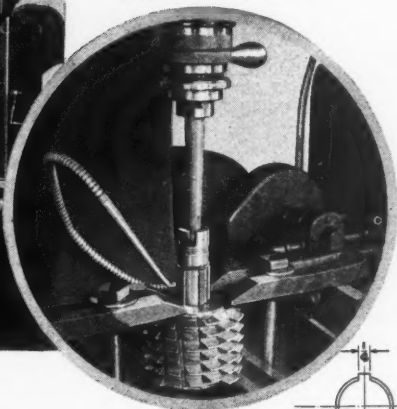
With the present methods of hypoid gear generation, tooth surfaces can be produced to match those of the mating gear over the entire length and depth of the tooth profiles. However, to avoid the necessity of extreme accuracy in the setting of the gears, and to provide a certain range of practical running positions, the bearing area is usually somewhat restricted. Any deviation from full tooth bearing can be obtained by simply changing the position of the cutter when generating the teeth. If it is desirable to counteract the changes which may take place in the hardening of the gear, the tooth bearing can readily be placed at any desired spot on the tooth surface. In this manner, hardened gears which are to be used without lapping can be made to operate quietly from the beginning. If lapping is permissible, however, the cutting process can be handled much more rapidly.

In general, the mountings for hy-

# ACCURACY WITH SPEED



What HUTTO GRINDING ACCURACY Means to the Tool Manufacturer.



**H**ERE is still another branch of industry where Hutto Grinding Machines and methods are setting new standards, new records, for accuracy on a production basis.

As an instance, take the grinding of the bores of gear hobs.

Material is high speed steel, sclerescoping 79 to 80.

The bores are ground to within .0002 inch, removing from one-half to one-thousandth, leaving a mirror-like finish.

But that isn't all.

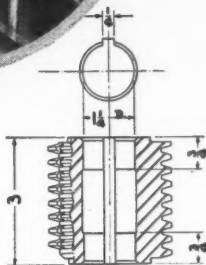
This machine produces a round, straight hole with perfect alignment between the two end bearings and at a greatly increased production rate.

And such an accurate bore means the ultimate proper alignment of the cutter teeth when they are to be shaped and sharpened.

This job is done with the Model MGAX Hutto Grinding Machine—its grinder head equipped with Carborundum Brand Hutto Processed Stones.

Just another instance of how these grinders are serving industry by promoting accuracy with speed.

Remember, any cylinders from  $\frac{1}{4}$ " to 60" diameter in almost any length can be more accurately ground on a Hutto machine.



## The Job

**MATERIAL**—High-speed steel gear hobs.

**STOCK REMOVED**—Half to one thousandth inch.

**GRINDING LIMIT**—.0002 in.

**FINISH**—High mirror.

**RESULTS**—Round straight holes, perfect alignment—ultimate proper alignment of cutter teeth.

**MACHINE**—Hutto Model MGAX.

Our Engineering Department is equipped to help you solve any internal cylinder grinding problem.

# HUTTO ENGINEERING COMPANY, INC.

## DETROIT, MICHIGAN

poised gears are the same as for ordinary bevels; careful consideration should be given to providing substantial mountings to reduce the deflec-

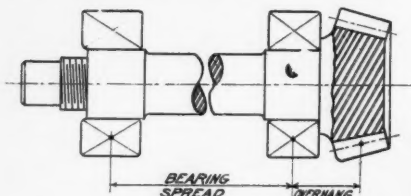


FIG. 4.

Fig. 4—The overhang of the pinion should not exceed 1-3 of the bearing spread.

tion and endwise displacement. On the hypoid pinion, the axial thrust is somewhat greater than on plain or spiral bevels, though in the average case this probably does not represent an increase greater than 10 per cent.

When a hypoid stem pinion is used, the overhang of the pinion, measured

from the center of the load application on the tooth to the center of the bearing directly behind the pinion, should not exceed 1/3 of the bearing spread. This is illustrated in Fig. 4. When a straddle mounting is used, it is equally important to have the bearings rigid and properly located to prevent deflection.

The cost of manufacturing hypoid gears will vary but little from that of spiral bevel gears, as the manufacturing operations are practically the same. The cost of the blanks will be the same in the case of the gear, but slightly greater in the case of the pinion, owing to the need for a slightly larger forging. The only major operation requiring equipment differing from that used for cutting spiral bevel gears is the finish cutting of the pinion. There are practically no size limits, as hypoid gears up to 60 inches in pitch diameter are now available.

## Items For the Notebook

By EDMUND LEDUC

**P**ARAFFINE applied to a grinding wheel will permit aluminum to be ground without clogging the wheel.

Spirits of turpentine is the best lubricant for drilling tempered steel.

Peroxide of hydrogen, applied to an under-exposed blueprint, will intensify it.

Solder, held close to the ear and bent, is of an inferior grade if it does not crackle.

To detect cracks in hardened steel, dip the steel in oil, wipe off, and paint with a mixture of alcohol and whiting. The alcohol will evaporate and any cracks will be indicated by oil marks on the whiting.

Lacquer applied to wood patterns makes them more impervious to moisture than shellac.

To obtain the correct belt length when installing a larger or smaller pulley, add to or subtract from the

belt  $1\frac{1}{2}$  times the difference in the diameters of the old and new pulley.

Clean threads can be cut in aluminum by using kerosene oil as a lubricant.

When tempering steel to a light straw color, a polished piece of steel should be kept at hand for purposes of comparison.

## Building the Straddle-Truck

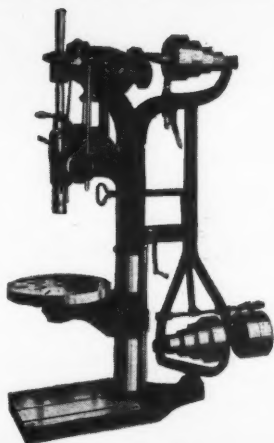
(Continued from page 14)

machine, set up to form a "hook clamp," is shown in Fig. 8. The clamps, one of which is shown on the machine, are made from  $\frac{1}{2} \times 3\frac{1}{2}$ -in. bar iron.

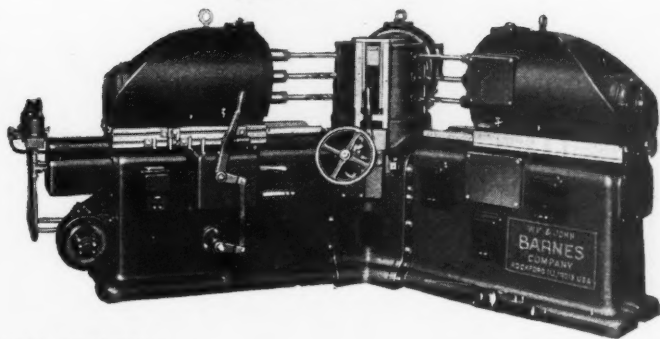
The frame of the carrier is of riveted construction, some 880  $\frac{5}{8}$ -in. rivets being used in a frame. Figure 9 shows two members of the assembly gang engaged in assembling a frame, the tools consisting of a Thor pneumatic hammer and buckler. One side of the final assembly department is shown in Fig. 10.

# STANDARD & SPECIAL DRILLING & BORING MACHINES

A complete line of standard upright drilling machines—single spindle and gangs—stationary and sliding head—belt and motor drive—with or without attachments.



At left is shown 25-inch Stationary Head Drill, with Power Feed, Automatic Stop and Back Gears, arranged for belt drive.



Special single-spindle or multiple-spindle machines, working from one direction or several directions simultaneously, with or without indexing table; for high production and heavy duty drilling, boring, reaming and similar operations.

Above is shown a 3-way drilling and reaming machine with elevating fixture.

Write for booklet entitled "Performance."

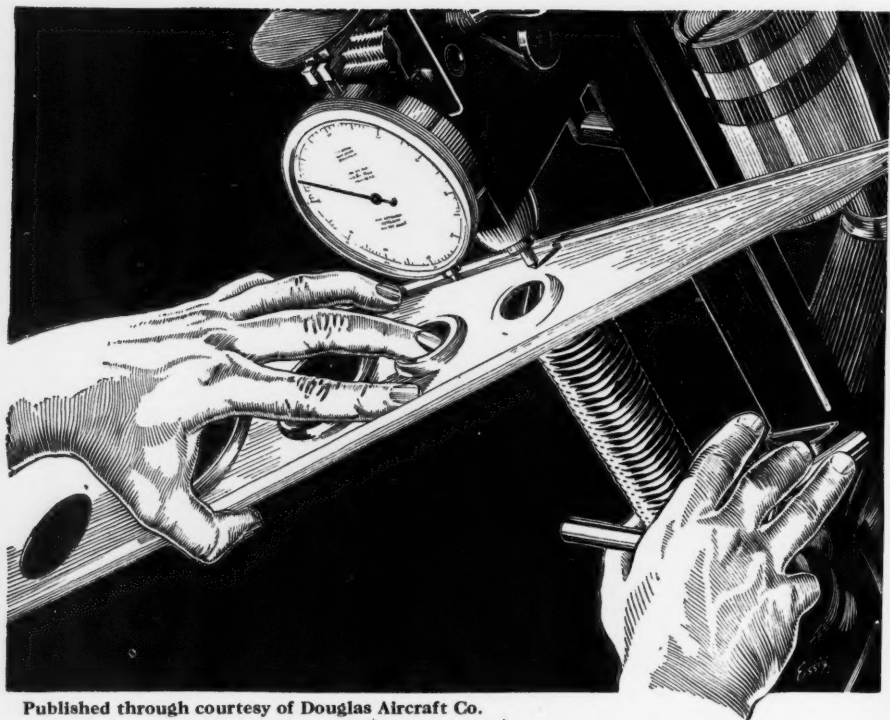
A SERVICE  
WHICH GIVES HIGH  
PRODUCTION  
WITH LOW  
MAINTENANCE

by

## W.F. and John Barnes Co.

ROCKFORD, ILLINOIS

Established 1877



Published through courtesy of Douglas Aircraft Co.

There are sound reasons why the  
**Rockwell Hardness Tester**  
has become the most used tester

- 1—Accurate
- 2—Agreement between all machines in reasonable condition
- 3—Speed
- 4—Adaptability
- 5—No experienced technique required
- 6—Only one dial and no microscope

**WILSON-MAEULEN** **CO**  
INCORPORATED

Concord Avenue and 143rd Street

New York



## **"Atkins Silver Steel Hack Saws — Best for Cutting High-Chromium and High-Carbon Steel"**

Says E. W. Gardner, Manager, Modern Tool Company,  
222 Post Square, Cincinnati, Ohio.

"We have found Atkins SILVER STEEL Saws by far the best for cutting the high-chromium and high-carbon steels now used in die-making. We tried all kinds of blades and most of them failed before cutting through one bar. The Atkins Saws sometimes run a month before they need changing."

Atkins blades cut from SIX to THIRTY TIMES  
more metal and cut TWICE AS FAST as  
any ordinary alloy blade manufactured.

**CUTS  
6 TO 30  
TIMES  
MORE  
METAL**

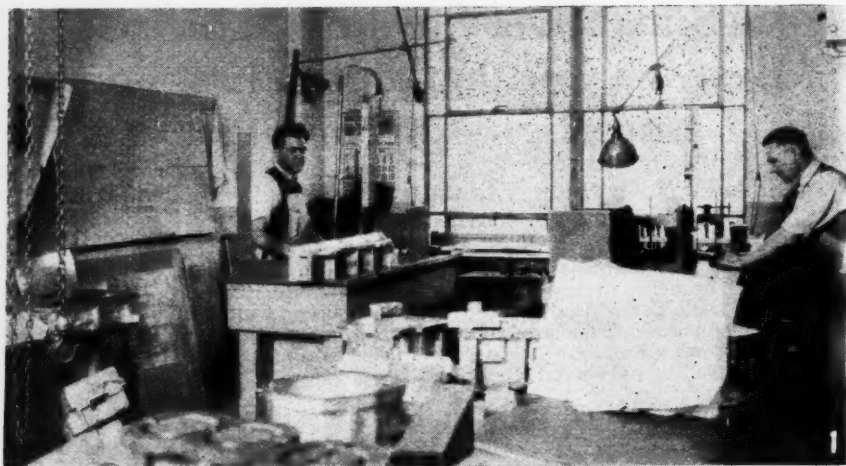
Investigate, ask us for detailed chart  
showing what can be done and  
the exact cost of doing it in  
your plant. Send now.

**CUTS  
TWICE  
AS  
FAST**



**E.C. ATKINS & COMPANY**

402 S. ILLINOIS ST.  
INDIANAPOLIS, IND.



## Making Metal Patterns in a Modern Shop

By DONALD A. CLARK

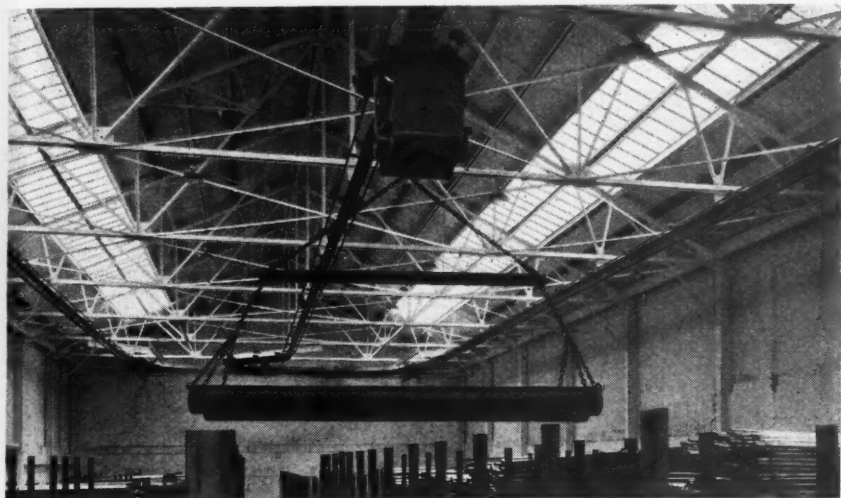
**P**ATTERN-MAKING is a quality job. A pattern, in itself, may not be worth a lot of money, but that pattern may be responsible for losses that would pay for the pattern many times over. The demand for better patterns for production, made to closer limits, and producing a minimum of stock on the casting, has narrowed down the range within which the patternmaker must work. High production requirements have necessitated the use of metal instead of wood patterns in many cases, which, together with the necessity for economy, has aided in the development of a class of craftsmen of the highest skill.

In laying out a pattern the layout man is called upon to work with intangibles, such as the amount of shrinkage that will take place when a casting is cooling, and the method of gating. Only those who are famil-

iar not only with the theoretical but also the practical side of molding can design a pattern to the best advantage, and only workmen who are accustomed to working within limits of a few thousandths of an inch are considered sufficiently qualified for the work of finishing metal patterns.

Back in 1913 a Detroit patternmaker, Vaughan Reid, anticipating the growing demand for castings to supply the automobile industry and the increasing necessity for better patterns, joined with Fred J. Coultou in organizing the City Pattern Works. Their first pattern was delivered on a bicycle; at the present time their delivery fleet consists of six cars and two trucks. The volume of business that passed through this plant during 1928 and 1929 exceeded \$1,000,000 each year and the business depression during the first half of 1930 had little

## *Cost decreased . . . Speed increased*



### *. . . by planned load handling*

**B**ACKBREAKING work, expensive and dangerous, too, when pipe was handled by hand in this Pacific Coast warehouse of the Crane Co. 4 men using two Shepard Cage Operated Hoists on a Shepard Monorail System, now do the work of 9. They do it faster and at less cost.

Comparable economies in time, labor and money are derived through the use of planned load handling in every branch of industry. Shepard provides it with hoists of the exact type, capacity and speed for practically

every need—the most complete line of hoists in America.

Every Shepard has the “balanced” drive; is lubricated automatically from an oil bath, and has all vital parts completely enclosed. Alignment is permanent and control for every motion is featured by its accuracy and promptness of response.

Some of the many applications of the Shepard Cage Operated Electric Hoists are illustrated and described in the “Aerial Railway of Industry” Bulletin. Write for a copy.

#### **SHEPARD NILES CRANE & HOIST CORPORATION**

Main Office: 424 Schuyler Ave., Montour Falls, N.Y. Works: Montour Falls, N. Y., Phila., Pa.

# **SHEPARD**

**CRANE & HOIST DIVISION**

THE MOST COMPLETE LINE OF



CRANES & HOISTS IN AMERICA

effect on the volume of orders that flowed into this shop.

The plant is equipped for the production of both wood and metal patterns, although only the metal pattern department will be discussed in this

for any type, kind or size of foundry equipment required. These designers are among the best in their line and the service available has proven so satisfactory in the past that many of the firm's customers now look to them for complete service on patterns.

The building in which the plant is located contains 22,000 square feet of floor space with a complete foundry and machine shop on the first floor. The wood pattern shop and part of the metal shop, engineering department, and offices are on the second floor. Eighty

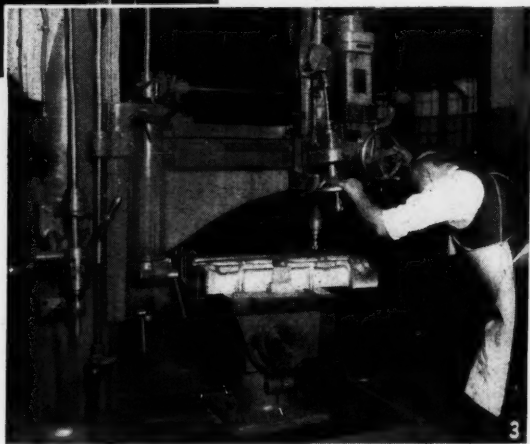


Fig. 2—Flat surfaces are machined on this planer. Fig. 3—Large castings are drilled or counterbored on the radial drill.

article. The metal pattern department is much the larger and is constantly growing. The wood pattern department has become the smaller part of the business as regards experimental and small order patterns, but, of course, will always remain the key part of the work which goes through the metal end.

Metal patterns are more expensive as to first cost but are superior to wood, more durable, and more accurate, being, in most cases, completely machined. Metal patterns are more economical under large production requirements. The customer who comes to this shop can, however, be supplied with any kind of pattern desired in either wood or metal.

An engineering department is maintained in which patterns are designed



men are employed in the pattern shop alone, exclusive of the foundry, core-room, grinding room and machine departments. The foundry equipment includes one 1,000 lb. oil-burning tilting furnace and six oil-burning pit furnaces with capacities of 225 lb. each, as well as two aluminum furnaces of 250 lb. capacity each. The foundry serves not only to furnish this plant with its own castings but also provides an opportunity to keep a

## A Few of Our Small Tool Specialties

### Gages:

Plain Cylindrical  
Plugs  
Plain Cylindrical  
Rings  
Internal Taper  
External Taper  
Internal Spline  
External Spline  
Thread Plugs  
Thread Rings  
Internal Micrometer  
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## Supplying the World with the finest of Small Tools

This manufacturing organization is one of the largest and oldest in this line. Their reputation for producing the most advanced and finest small tools is known the world over.

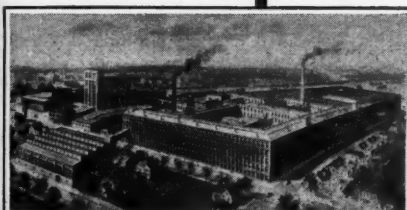
The application of these small tools to your manufacturing processes is one of the surest ways to increase production and cut down cost.

*Would you like more detailed information?*

*Send for catalog.*

## The Taft-Peirce Manufacturing Company

WOONSOCKET  RHODE ISLAND, U.S.A.



*VIEW OF THE MAMMOTH PLANT DEVOTED TO  
THE MANUFACTURE OF SMALL TOOLS.*

*PARTIAL VIEW OF SMALL LATHE DEPT.*



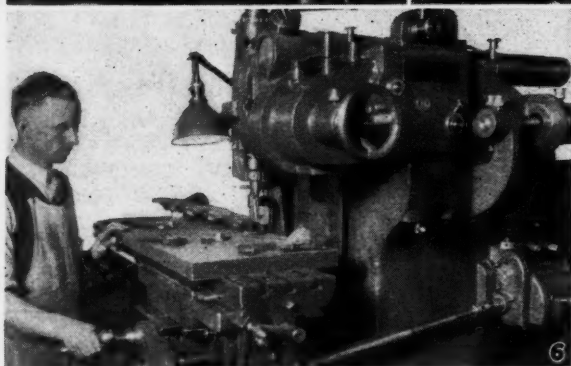
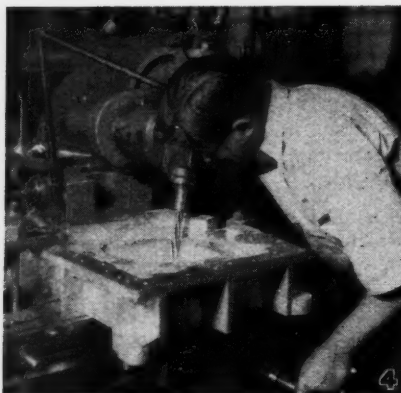


Fig. 4—Machining an angular face on the interior of an aluminum core-box for a transmission case. Fig. 5—Milling a compound angle on a core-box for a tractor engine pattern, using a Van Norman Duplex Miller and a Boston Universal Angle Plate. Fig. 6—This is the largest one of the eleven Van Norman Duplex Millers which are a part of the plant equipment.

constant check on the action of metals in casting, and the behavior of patterns in operation under all conditions. The superintendent of the foundry is considered a genius in his line, a fact which is a valuable asset to the City Pattern Works and their customers. He alone could plan and lay out any job that comes to the plant.

Vaughan Reid, President of the City Pattern Works, believes that a first-class workman at a good rate is much more economical than a mediocre workman at any rate. Accordingly, the personnel of this organization includes only the best artisans. The best possible working conditions are maintained; the building is of the modern "daylight" construction, and

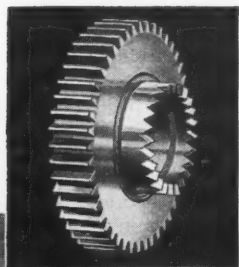
the equipment is kept in first-class condition at all times. Whenever a machine gets to the point where it is inaccurate or becomes so difficult of operation that it causes an appreciable waste of time it is immediately scrapped. In cold weather the temperature of the plant is automatically maintained at 70 degrees Fahr. Shower baths, located on the first floor, are available to the men at all times.

Each metal pattern casting passes through the layout room, shown in Fig. 1, on its way to the shop. Here layout men are kept busy laying out castings to conform to the blueprints. This eliminates the possibility of the machines standing idle while the operators determine the amount of stock that must be removed from the various surfaces. Each finished pattern also passes through the lay-

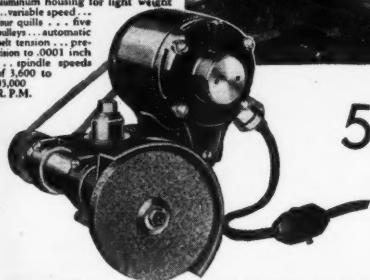
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of 3.6  
35,000  
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# less than a minute per Operation . . .



The Dumore Grinder No. 5 has a full 1/2 h. p. Dumore Motor of the universal type . . . automatic oiling system . . . fan which keeps the motor "cool" under all conditions . . . aluminum housing for light weight . . . variable speed . . . four quills . . . five pulleys . . . automatic belt tension . . . precision to .0001 inch . . . spindle speeds of 3,600 to 19,000 R.P.M.



## 5 accurate grinding operations per piece in 4 1/2 minutes . . . by Durant Manufacturing Co.

WHEN speed without loss of accuracy is needed Dumore Grinders are more than equal to the situation. Durant Mfg. Company, Milwaukee, makers of Productimeter counting machines, had a rush order for special, high speed counters in which the driving gears, of high grade tool steel, each required five grinding operations, three external and two internal. Specifications required outside face ground to overall length of .468 inch, with no tolerance above and .001 minus; inside face ground to a width of .250 inch, plus or minus .001 inch; outside diameter of hub ground to .625 inch, tolerance of .001 minus. These five operations on each piece were accomplished in 4 1/2 minutes by means of two No. 5 Dumore Grinders; one grinder set up for the external and the other grinder set up for the internal grinding. Fast and accurate performance is usual with Dumore Grinders.

THE DUMORE COMPANY, 28 Sixteenth St., Racine, Wisconsin



THE DUMORE COMPANY  
28 Sixteenth St., Racine, Wis.

Please send facts on No. 5  
Grinder together with free  
copy of "Precision Grinding"

Name.....  
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**DUMORE HIGH-SPEED GRINDERS**  
REG. U. S. PAT. OFFICE

out room as it leaves the shop, and is carefully inspected as to accuracy before being released to the customer.

Large castings with flat surfaces are sent from the layout-room to the planer, Fig. 2, where the flat and angle surfaces are machined. The castings are then returned to the layout-room for further laying-out before the remaining operations are performed. Drilling, counterboring, or other similar operations on large castings are performed on the drill press shown in operation in Fig. 3. The operator is

shown counterboring holes in a core-box for an automobile exhaust manifold. As this pattern is one of a quantity that are identical, a jig is used for the drilling and counterboring operations.

The Van Norman Duplex Miller shown in operation in Fig. 4 is one of the eleven machines of this type that are kept continuously busy on the machining of metal patterns. Here the machine is shown with a left hand spiral cutter machining a ten-degree angle on the inside of an aluminum pattern for a transmission case. The ease with which the head of this machine can be swung to any angle in either direction makes it an ideal machine for pattern work.

The operator shown in Fig. 5 is using a Van Norman machine with a Boston Universal Angle Plate to mill a compound angle in a core-box for a pattern that is to be used in making a part for a tractor engine. The machine head is set at an angle of 1 deg. 50 min., and the angle plate is set to

(Continued on page 38)

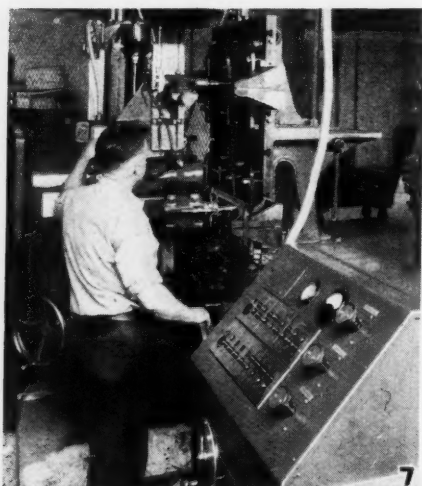
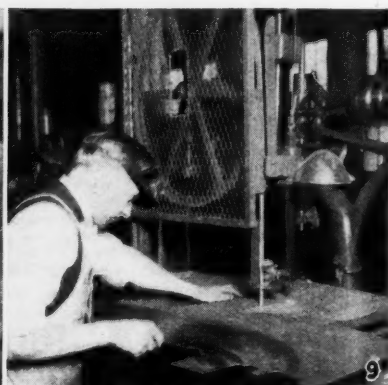
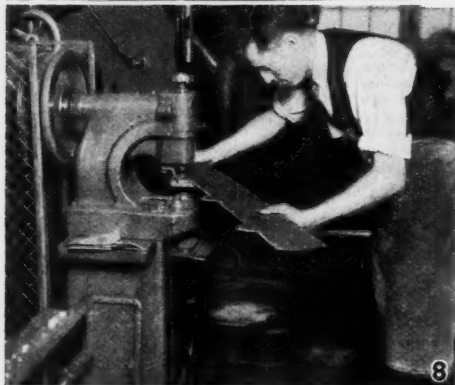
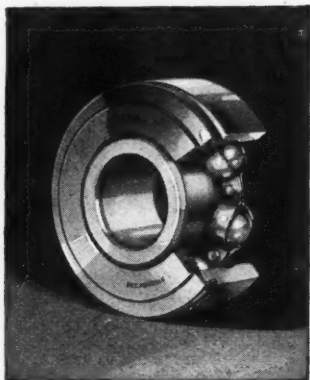


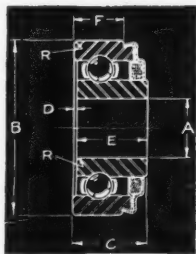
Fig. 7—The Keller B L 3620 Full Automatic Machine. Fig. 8—Using a Campbell Nibbling Machine to "nibble" the outline of a sheet steel face for a manifold core-box. Fig. 9—Sheet aluminum is sawed to shape on this Fay & Egan metal band saw.





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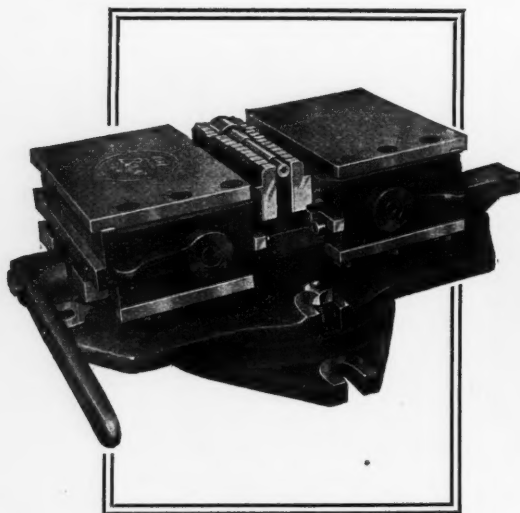
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### Making Metal Patterns

(Continued from page 34)

produce an angle in the other direction of 1 deg. 45 min. This combination of equipment makes it possible to obtain any two angles desired at one setting.

The machine shown in Fig. 6, which is also a Van Norman Duplex Miller, is included merely to indicate the variety in the sizes of equipment available. This machine is used to machine patterns that are too large for the smaller machines. The piece in process, which is one-half of a manifold pattern, is considerably smaller than the class of work for which the machine is generally used.

The Keller Full Automatic Engraving Machine shown in Fig. 7 is used to great advantage in producing multiple and duplicate patterns, and is considered the "last word" in pattern shop equipment. When a number of patterns of the same kind are to be made, the first one is machined and

finished in the usual manner and this one is used as a pattern for producing the others. The original pattern is set up on the vertical face and a cutter is adjusted to machine the blank casting. The movement of the cutter-spindle is electrically controlled from a stylus which traces the outline of the finished piece and duplicate patterns are accurately finished in a fraction of the time formerly required.

One of the most useful machines in the shop is the Campbell Nibbling Machine shown in use in Fig. 8. The operator is using the machine to "nibble" the irregular outline of a "face" for a manifold core-box, the material being  $\frac{1}{8}$  in. sheet steel. In some instances as many as eight pieces of the same shape are to be made, in which case the patternmaker nibbles the first one to shape and then, using the first one as a pattern, finishes the rest in one operation. According to authorities, the nibbling machine pro-

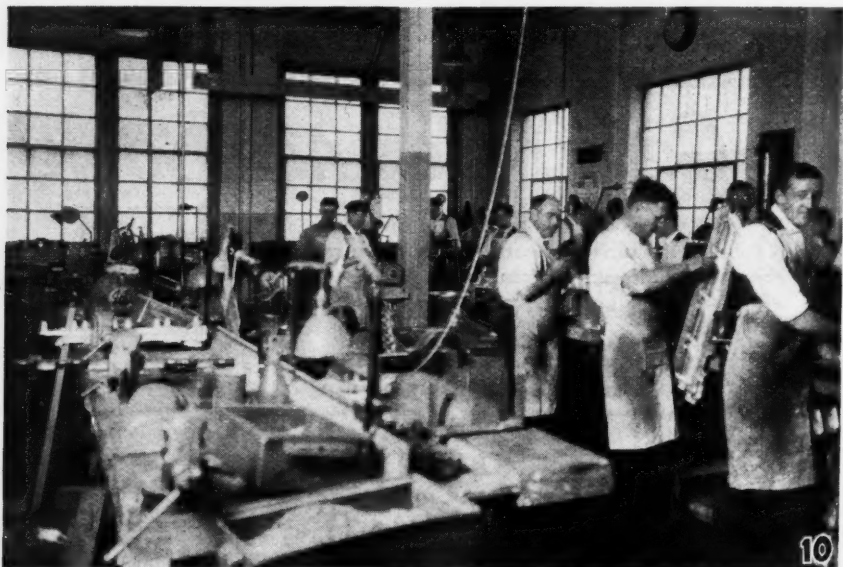
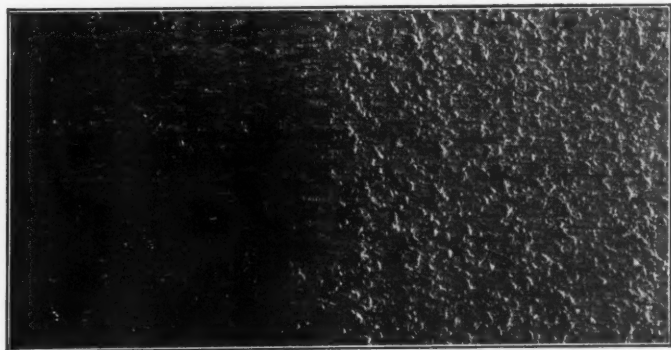


Fig. 10—The bench department. All fitting and assembling is done in this department.



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vides a means for handling this type of work which is many times faster than any other method. Sheet aluminum, which is very soft, is cut to shape with a Fay & Egan metal band saw, as shown in Fig. 9.

All fitting and assembling of parts to make the complete pattern equipment is done in the bench department, part of which is shown in Fig. 10. In addition to the regular bench equipment, such as vises, adjustable arms for individual lights, and so on, the department is provided with a num-

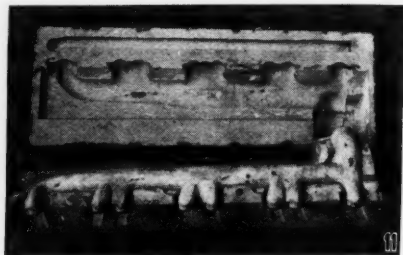


Fig. 11—A finished plaster mould with plaster core. The plaster cast provides a check on the accuracy of the core-box in relation to the pattern.

ber of flexible shaft grinding machines, which are to be hung from above on tracks now being installed, filing machines, bench disc grinders and other equipment to reduce hand labor and expedite operations.

Each core-box in an equipment is proved, before it is released, by making a plaster cast of the core-box. The two halves of a plaster-mould with a plaster cast of the core in place are shown in Fig. 11. By the fitting of this core, a check is obtained on the accuracy of the core-box as well as the relation of the core-box to the pattern. When there is any doubt as to how a pattern equipment will work in production, the entire equipment is sent to the foundry division and a sample casting is made and returned to the layout room for a casting check.

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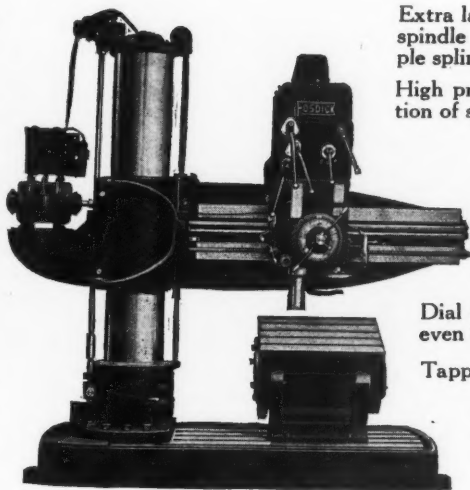
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## Modern Tooling Practice, VI

By FRANK W. CURTIS

**T**HERE are many styles of indexing fixtures applicable to various classes of work. The indexing mechanism must be quite rigid and for this reason it is often advisable to use

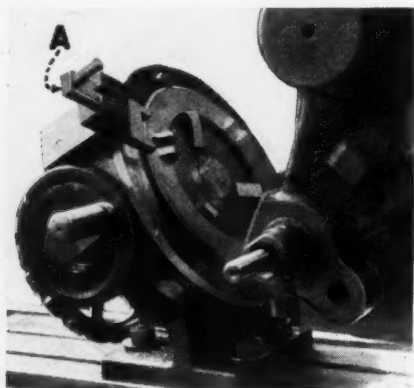


Fig. 44—Angular-type indexing fixture.

worm gearing for indexing purposes. Plunger-type indexing fixtures are also broadly used, but their construction is such that all moving parts are carefully fitted and lined with hardened surfaces.

In Fig. 44 is shown an angular-type indexing fixture for the machining of three sets of bosses in a clutch plate. The work is located from the outside diameter—which has previously been finished—by means of three pins. Three jaws of the hook-bolt type, which are operated from a handwheel at the underneath side of the fixture, hold the piece in position. The fixture is indexed by means of worm gearing, operated by a small handle at the front side, and radial location is

obtained by means of the sliding block A, which is withdrawn after the piece has been aligned. The handle that operates the gear is provided with a spring plunger, which engages a hole in a stationary flange. Fixtures of this type provide for rapid production, the average output in the example shown being more than 100 pieces per hour. The operation consists of the milling of a slot  $\frac{3}{8}$ -in. in width, which is cut from the solid. The sides of the projections are straddle-milled at the same time.

Another form of indexing fixture is illustrated in Fig. 45. The workpiece in this case is a casting with a cylindrical member on the opposite sides of which flats are to be milled. The pieces are straddle-milled, four pieces being milled at a setting, as shown. The opposite side of the fixture is reloaded during the cut. In this example, the indexing base is of standard design as produced by a milling machine manufacturer, and the fixture itself is made as a supplementary

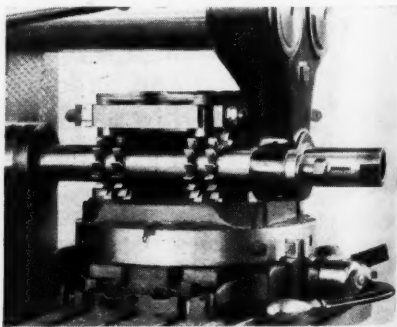


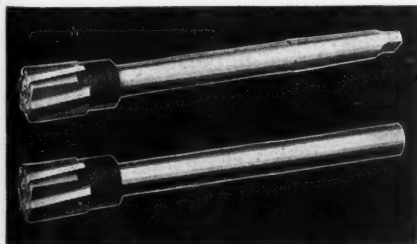
Fig. 45—Straddle-milling cylindrical parts.



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unit, attached to the rotating table.

In Fig. 46 is illustrated a rather unique fixture for the milling of two pads on the top side of a cast-iron cover. The design represents a method of operating a clamp at the rear side of the fixture by means of a lever at the front side, convenient to

F. Another feature of the fixture is the hardened set blocks shown at L, which aid in setting the milling cutters to the proper height. The block is used in connection with a feeler .250-in. in width. In use, the feeler is placed on top of the block and the cutters are adjusted until they just

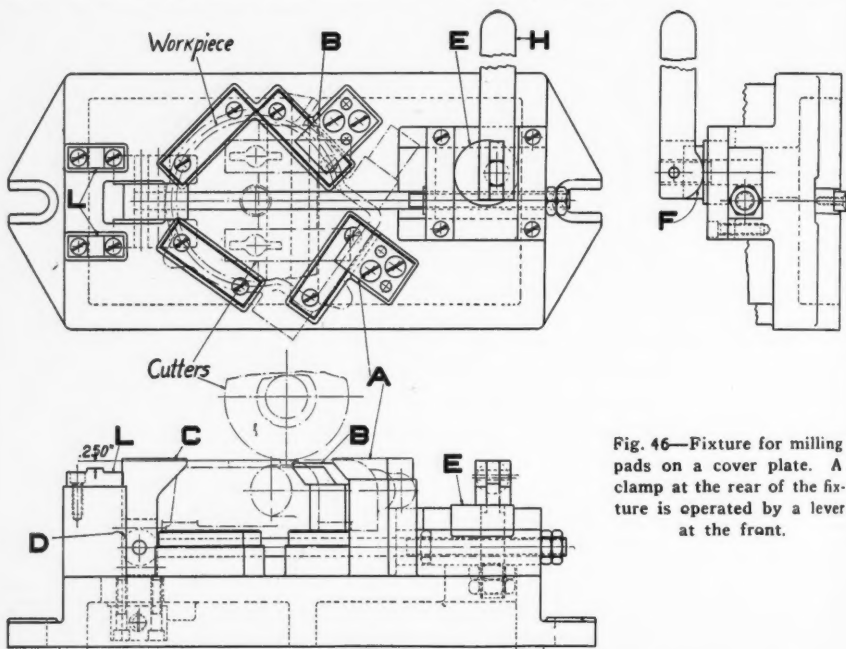


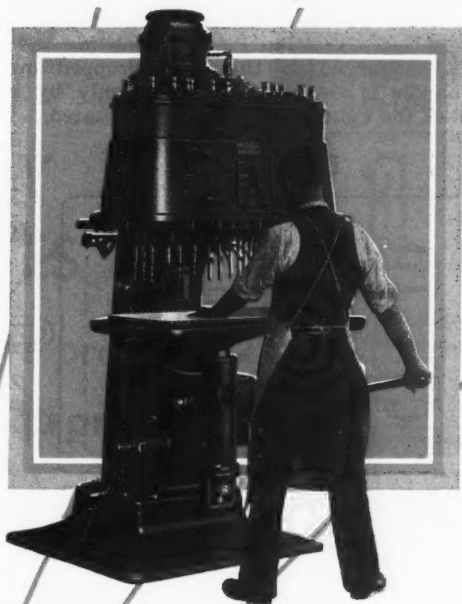
Fig. 46—Fixture for milling pads on a cover plate. A clamp at the rear of the fixture is operated by a lever at the front.

the operator. At A and B are shown two stationary locating blocks having angular faces to suit the upper section of the casting. The movable clamp, which forms the third point, is of the hinged type as shown at C. It is engaged by means of the eye bolt D, which is operated by means of the eccentric E. In operation, the handle H is swung in a horizontal plane, pulling the eccentric with it and thus drawing in the eye bolt. As soon as the hinged clamp has been properly secured against the work, the handle is forced down, a binding action being created by the cam face

strike the top face of the feeler, thus assuring a correct cutter setting in relation to the bottom face of the workpiece.

Milling fixtures afford opportunity to use various forms of combination clamps to aid in reducing the loading time. Such a clamp is illustrated in Fig. 47. The workpiece in this case is located from the cylindrical projection A, which fits into a hole in the block B, fastened onto the fixture base. The overhanging portion of the workpiece, C, is located by means of a plug attached to a spring plunger. Clamping of the workpiece is accom-





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plished by means of the handle **H**, which is attached to the pin **P**. An eccentric, **K**, is turned on the pin. When the handle is lowered, the eccentric strikes the cylindrical part of

locking pin of the spring plunger. In loading the fixture, the workpiece is dropped into place and held down firmly by hand, then the handle is actuated, which binds the work securely and likewise locks the spring plunger.

An example of a welded fixture is illustrated in Fig. 48. The design shows the scope of this type of construction. The two overhead clamps are attached to vertical shafts, each of which carries a heavily-constructed, hardened steel sleeve. To each sleeve is attached a handle by which it may be revolved on the shaft. The sleeves are made to slide in bushings which are integral with the fixture, these bushings each having a helical slot through which the handle protrudes. Movement of the handle from left to right forces the shaft upward and the free end of the clamp is forced down on the work. Various features of welded tooling were shown in Figs. 1, 3 and 4.

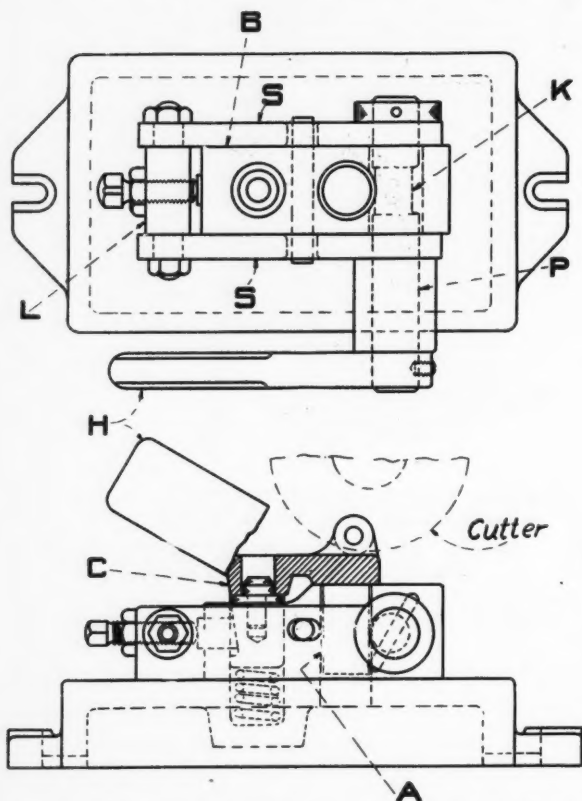


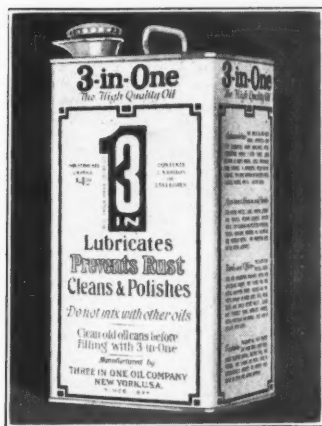
Fig. 47—Fixture with cam-action clamp. Operation of the cam by means of the handle **H** brings pressure to bear at opposite points of the work.

the work, causing a binding action. At the same time the two straps **S**, which are mounted on the fixture by a pin in such a way that they can float, are caused to move towards the right-hand side of the fixture. These straps are connected at the left-hand side by a block **L**, which carries a setscrew that, in turn, strikes the

Air cylinders are used extensively for clamping purposes in connection with milling fixture design, and their use will be found to reduce the loading time as well as to provide a rigid means of holding workpieces securely. In Fig. 49 is illustrated some of the possibilities of air-operated fixtures. At **A** is shown a fixture having an air

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cylinder, **B**, which operates the swivel clamp **C** by means of a plunger. In this case the cylinder is made integral

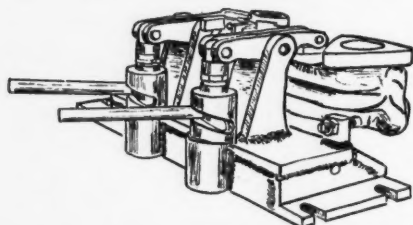


Fig. 48—Another type of cam-action clamp, applied to a welded fixture.

with the base casting of the fixture, although in many cases it is possible to make the cylinder in the form of an auxiliary unit. The nature of the fixture in operation generally determines which principle should be used. At **D** is shown a method of operating a clamp by means of a plunger. The projecting end of the plunger is provided with an elongated slot into which fits the heel end of the swivel clamp. When the plunger is raised by the air cylinder, it causes the clamp to strike the workpiece.

Another example of air-operated fixture design, having the cylinder made as an integral part of the fixture, is shown at **E**. In this case, the cylinder is located vertically so that the plunger strikes the horizontal swivel clamp **F**. It is quite possible to use cylinders as small as  $1\frac{1}{2}$  in. in diameter, such as the one shown at **G**. The cylinder, in this case, is made as an auxiliary unit and has a small plunger that is withdrawn from the work by means of a spring after the air pressure has been released. An enlarged view of the cylinder is shown at **H**. In using cylinders of this size it is quite possible to arrange a number of them in series, so that the operation of a single valve will cause the entire series to function simultaneously.

In Fig. 50 is shown an air-operated milling fixture for the straddle-facing of both ends of connecting rods. The illustration shows the method of operating the overhead clamp, which is done by means of a toggle and lever. In this case, a double-acting air cylinder

(Continued on page 52)

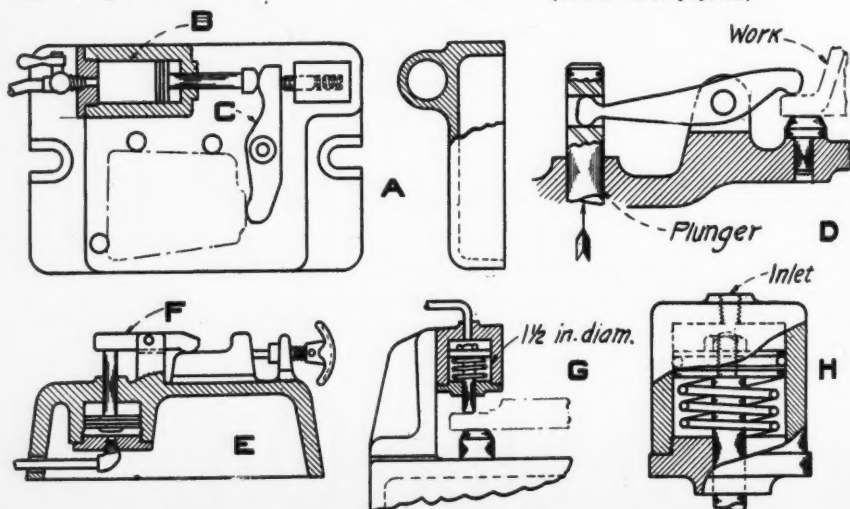
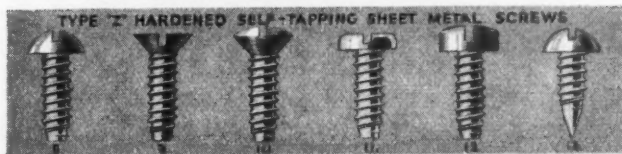


Fig. 49—Example of application of air-cylinder for clamping.

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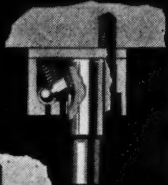
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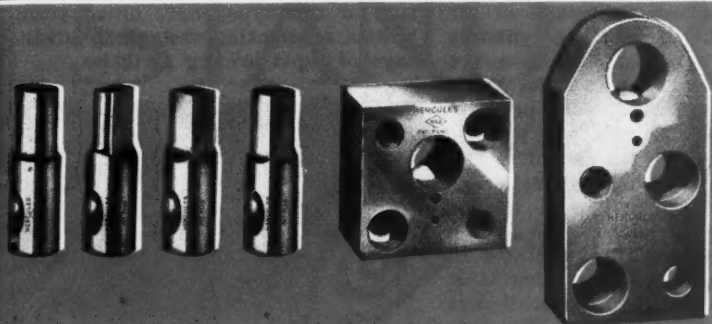
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### Modern Tooling Practice

(Continued from page 48)

der is used, so that a positive return action is attained by means of air pressure. Whenever larger cylinders are used, it is advisable to use the double-acting type in preference to the single-action cylinder. The operation shown is of the reciprocating type. A similar fixture to that shown at the left side of the machine is located directly opposite, although it is not shown in the photograph. A set-up of this kind permits the operator to load one fixture while the other is in use. The feature of the operation is the rapidity with which the work can be loaded and unloaded.

Another form of milling fixture is illustrated in Fig. 51. The air cylinder is made as an auxiliary unit and operates the arm A, which engages the vertical slide B. To the slide is attached a pin on which is mounted the equalizing clamp C. On each end of

the clamp is located a swivel clamping block, as shown at D, which engages the top face of the workpiece. A fixture of this type offers broad possibilities, having the outstanding advantage of rapid loading facilities.

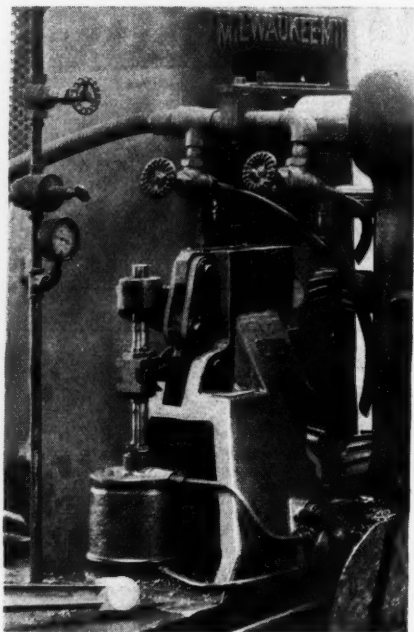
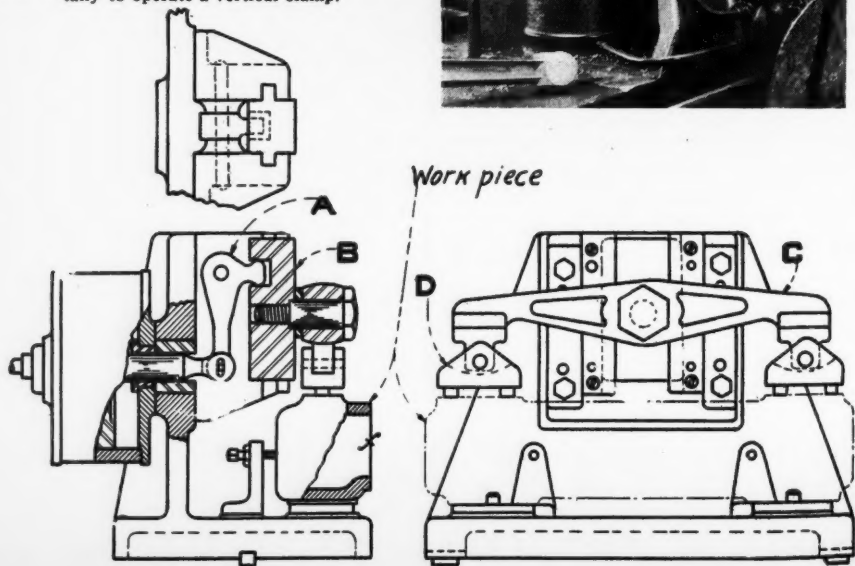
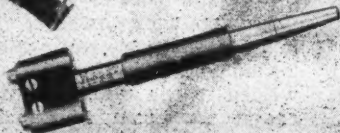
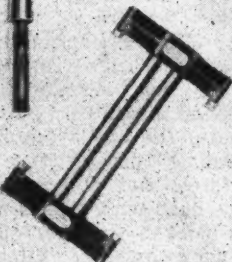
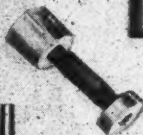
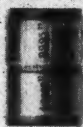
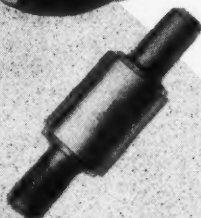
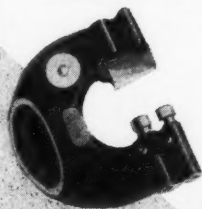


Fig. 50 (Right)—Air-operated clamp applied to fixture for Straddle-Milling connecting rods.

Fig. 51 (Below)—Air-cylinder applied horizontally to operate a vertical clamp.



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## A Well-Constructed "Cracker Pit"

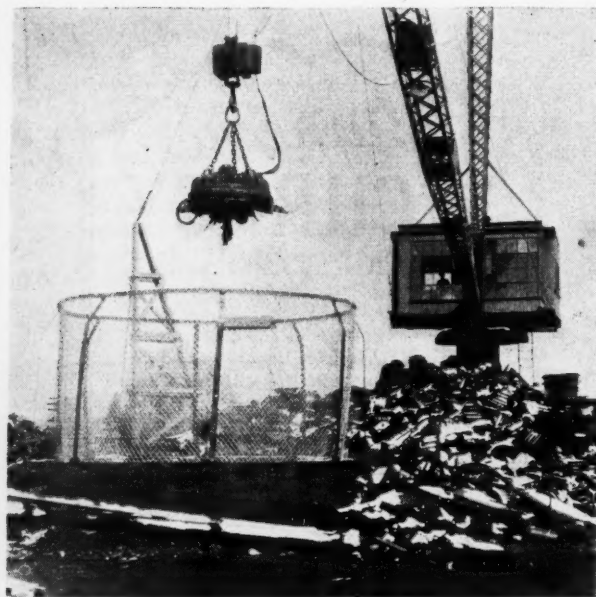
By JOS. C. COYLE

**W**HAT is probably one of the most efficient developments of its kind is the "cracker pit" in which the foundry scrap is broken up at the General Iron Works, Denver, Colorado. The present pit is the result of

rear of the foundry, and an all-welded shell of  $\frac{1}{2}$ -in. steel plate with a 6-in. angle ring at top and bottom was inserted. Below the bottom of the shell a concrete base, 7 ft. thick and 10 ft. in diameter, was poured about a cluster of scrap shafting. The inside of the shell was lined with cottonwood blocks, 2 in. thick and 10 in. long, closely wedged in between the angle rings and with the ends out. The bottom of the pit was covered with tough blue clay about a foot deep. Here again experiment with different kinds of dirt resulted in the selection of the best clay for the purpose.

To give the derrick operator an unobstructed view of the interior of the pit, an opening 4 ft. x 5 ft. 6 in. was left on the side toward the machine. This opening was framed with 2x6-in. channels on the inner edge. These channels were filled with

2-in. planks and this in turn by a 6-in. wearing plate, the whole secured by bolts extending through the wood blocks and steel shell and inset sufficiently to be flush with the inner surface of the blocks. Over the opening is a curtain of chains of  $\frac{3}{4}$ -in. steel hung on a  $\frac{3}{4}$ -in. rod, which in turn is supported by five 1x4-in. bars welded to the top of the shell. The chains are about four inches apart, spaced by short sections of pipe slip-



Derrick with magnet about to drop scrap into "Cracker Pit" at General Iron Works.

extensive research and experiments with pits of various types and designs, and has given complete satisfaction since its installation. A square pit was tried, but trouble was experienced in picking the 3,400-lb. steel ball, which is used to break the scrap, out of the square corners.

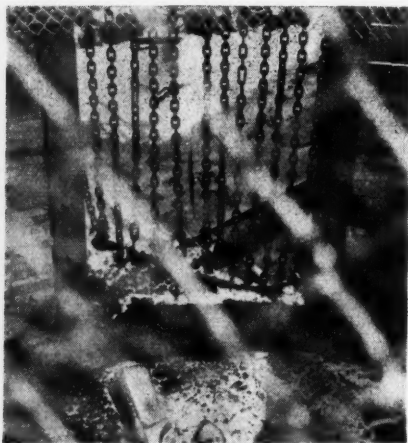
The present pit is 9 ft. deep and 15 ft. in diameter. In constructing the pit, a hole was first dug in the ground, within reach of the big derrick at the

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Opening through which operator can see interior of pit.

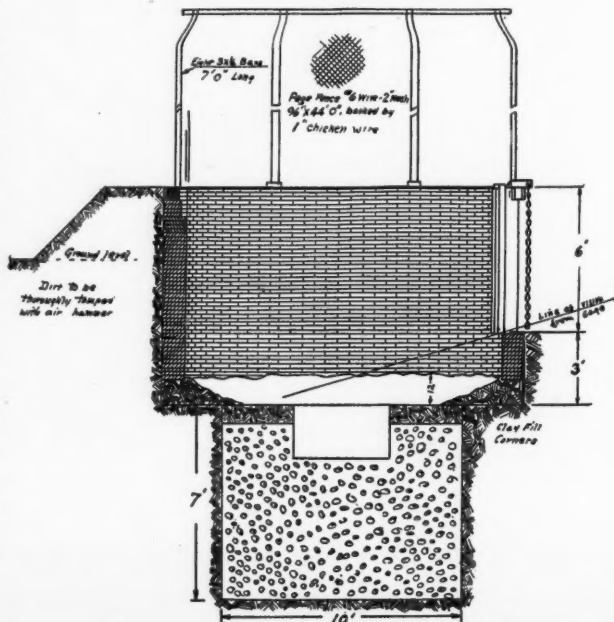
ped over the rod on which the chains hang.

About seven feet of the pit is below the ground level, the surplus dirt from the hole being banked around the upper two feet. In order to safeguard passers-by while the pit is in operation, and to protect trains and property of the railroad which passes nearby, a screen 7 ft. high was erected about the top of the pit. This screen is of No. 6 Page wire fence, with 2-in. mesh, backed on the outside by 1-in. mesh No. 19 chicken wire. The screen is supported on a  $\frac{3}{4}$  x 2-in. spring steel band secured to the tops of eight  $\frac{3}{4}$  x 3-in. upright iron bars, set in short angle clamps welded to the

top of the steel shell. The dirt fill about the pit was thoroughly packed by tamping with an air hammer.

The springy construction of the screen above the pit stops any flying bits of metal and yet gives sufficiently before them to avoid damage to the mesh. The cottonwood blocks in the pit wall are also tough enough to resist damage by the sharp corners of metal, and the round shape of the wall makes the steel ball easy to reach with the magnet. The magnet is also used to drop scrap into the pit and to remove it after it has been broken into small pieces. A peculiar feature of the operation is that the steel ball splits after it has been in service a certain length of time, and must be replaced.

The pit was developed by the chief engineer of the Stearns-Roger Company, which is one of the firms operating the co-operative plant of the General Iron Works.



Cross-section drawing showing design of pit.



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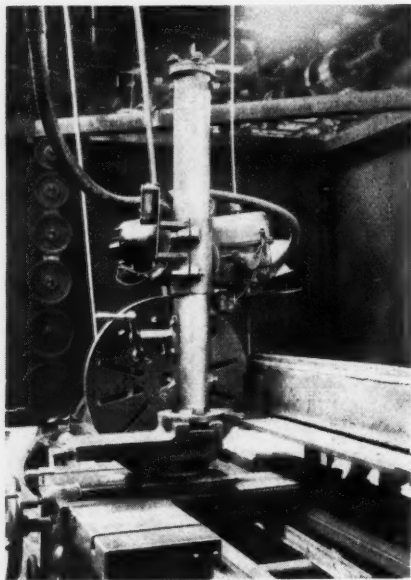
## Ideas From Readers

*This department is a clearing house for ideas. If there is a "kink" or short-cut in use in your shop, send in a description of it. We will pay \$5 for each one published.*

### Old Lathe Utilized For Welding Guides

By JOHN MCCULLAGH

**T**HE illustration shows how an old lathe was adapted for use as a welding machine for building up the sides of worn guides in a railway shop.



Welding guides with an old lathe revamped as a welding machine.

The welding is of the arc type and the operation is handled semi-automatically. The guide is held on a bracket that is attached to the rear of the lathe. On the tool post is mounted a vertical arm carrying the automatic welding unit, as shown. The welding

unit consists of an individually-driven feed mechanism for the welding rod, which is drawn from a spool mounted on an overhead shaft.

When ready to proceed with the welding operation, the feed of the carriage is adjusted according to the size of bead required and the lathe is operated in the usual manner. The spindle of the machine rotates during the operation, although it does not function other than to transmit power from the countershaft to the feed rod or lead screw. After one bead has been laid along the edge of the guide, the compound is adjusted to suit the location of the next bead, and the process is repeated. This outfit provides a rapid means of reclaiming worn guides, which previously had been built up by hand—a slow process—or scrapped altogether.

### Design For Home-Made Oil Bath Tank

By H. L. WHEELER

**I**N the production of small tools or other parts that are to be oil-hardened, the hardening room is sometimes pressed to keep up with the shop. The illustration shows a design for an oil bath that has helped to solve the problem in one shop. The tank can be built at a reasonable cost, and the dimensions can be modified to suit local conditions.

The outfit consists essentially of an outer tank **A**, which is at all times full of cold water, and an inner tank **B**, which contains the oil. The oil tank is centrally located in the water tank,

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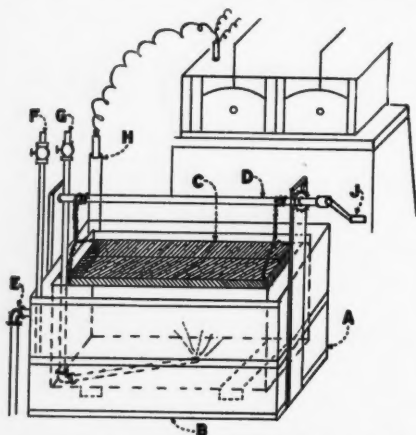
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a space of approximately six inches being left on each side. The oil tank is supported on short pieces of 3 x 4-in. wood, which raise it from the bottom of the water tank so that the cooling



Sketch showing design for oil bath tank.

water can circulate underneath. The water is kept running when work is in process, an overflow pipe E being provided to carry it off.

The basket C in which the work is held is constructed of perforated sheet metal or heavy wire screen, and is suspended by a chain from the winding shaft D. A ratchet and pawl on the winding shaft provides for anchoring the basket at any desired height. The shaft is supported on vertical struts attached to the ends of the outer tank. The basket C is approximately six inches deep and is made to fit inside the oil tank with a margin of space all around of about two inches.

Water enters the tank through the  $\frac{1}{2}$ -in. pipe F, and an air pipe G enters the oil-tank at one corner, extending to the bottom of the tank and projecting diagonally to the center. A continuous light flow of air keeps the oil agitated and also prevents the oil from becoming overheated. A 2-in. pipe H, fastened in one end of the water tank,

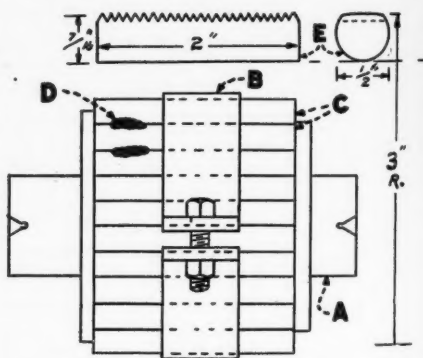
holds the cold end of the pyrometer. The tanks are built of heavy galvanized iron and angle steel. Seams are soldered where laps are necessary and the flat steel is riveted. The water tank may be constructed of wood, if desired or necessary.

In use, the work basket is immersed in the oil tank so that the oil is just over the top. As the work is taken from the furnace, it is dumped into the basket, and when a batch of work is finished or the basket is full, the basket is raised by means of the crank J to a convenient height for unloading. The overflow pipe may be connected to the shop drainage system where this is convenient, or it may be run out of doors if necessary.

## An Unusual Job of Thread-Cutting

By CHARLES KUGLER

**A** JOBBING shop was recently given the task of making 100 pieces, each consisting of a 2-in. length of  $\frac{1}{2}$ -in. drill rod, turned and threaded



An unusual method of holding work for turning and threading.

as shown in the illustration. One side of each piece was to be turned off to leave the piece  $\frac{1}{4}$  in. thick, and the turned portion of each piece was to be

(Continued on page 65)

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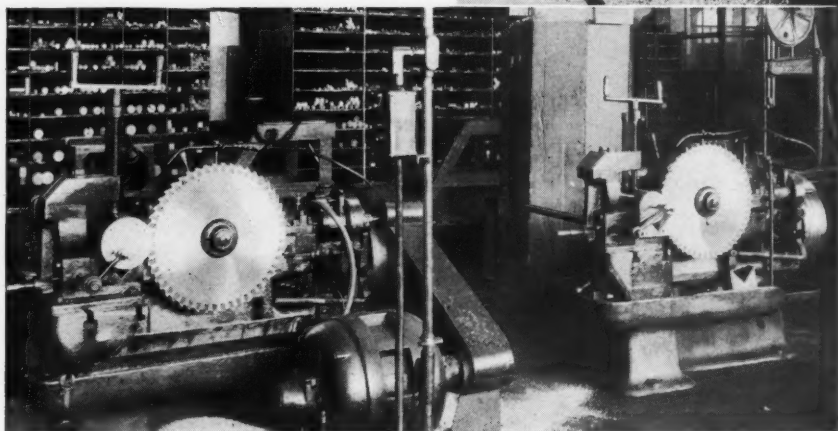
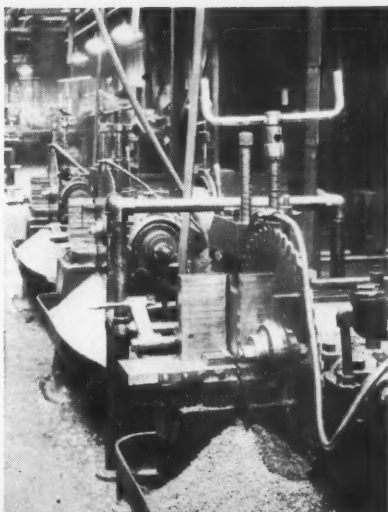
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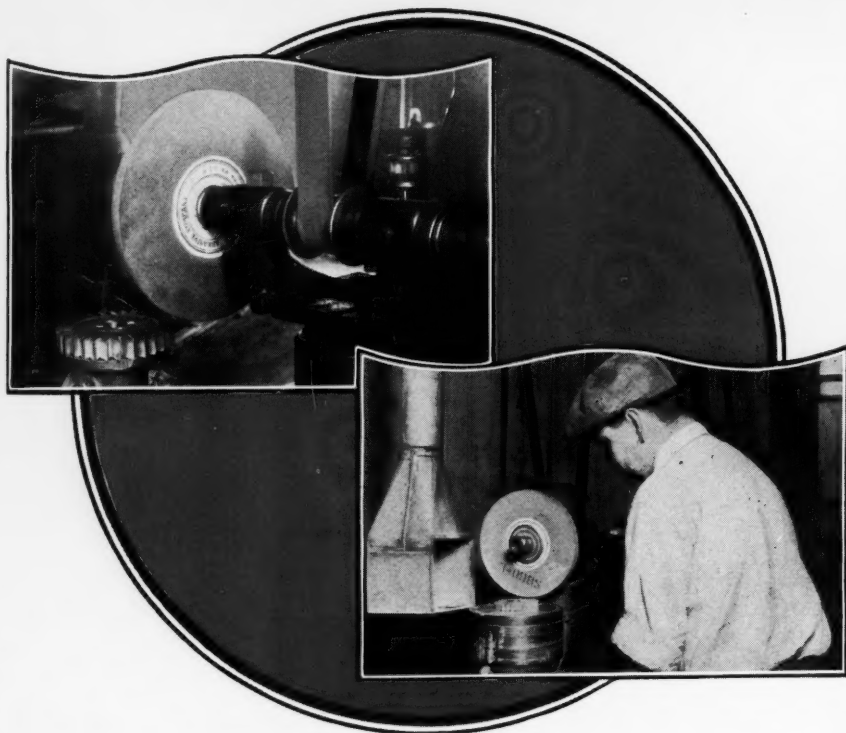
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The operation on the right shows an S.B. Borolon wheel grinding the sides of a cutter for removing the old teeth. This is done dry—the grinding wheel must cut cool and fast.

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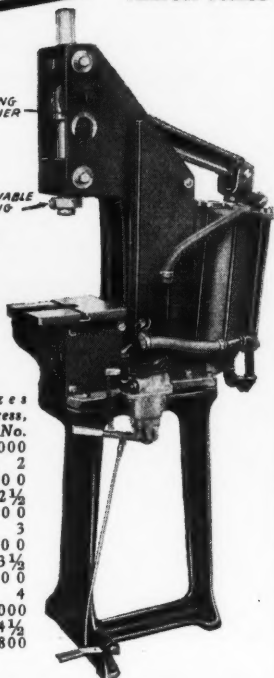
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## Unusual Thread-Cutting Job

(Continued from page 60)

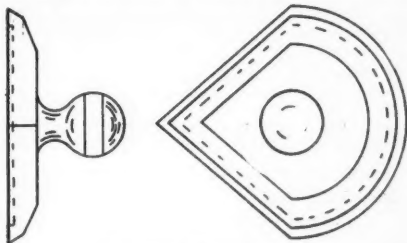
threaded on a 3-in. radius. The task was accomplished as follows:

A mandrel **A** was turned to a diameter of 5½ in., and a clamp **B** was made to fit around it with room under the clamp for as many sections of drill rod **C** as the periphery of the mandrel would accommodate. With the pieces clamped tightly in place, the mandrel, carrying the work, was heated hot enough to melt solder, then solder was run in between the pieces of drill rod, as shown at **D**, soldering the pieces together and to the mandrel. When sufficiently cool, the clamp was removed and the mandrel was placed in a lathe, where the pieces were turned and threaded according to specifications. When the job was completed, the mandrel was again heated and the pieces were removed. The dimensions of the finished piece are shown at **E**.

## Improved Burr Cutter

By F. J. WILHELM

**THE** burr cutter shown in the illustration is similar to the round type of burr cutter with which most tool-makers are familiar, but it has an advantage in that it can be used in places



Improved burr cutter.

that cannot be reached with the round cutter. The cutter is made of tool steel, tempered and ground to a sharp edge all around. The knurled ball which serves as a handle may be any

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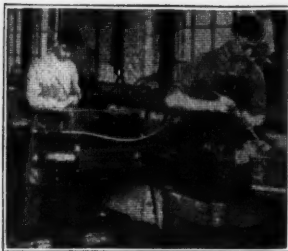
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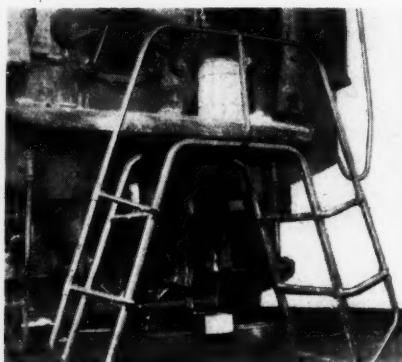
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size to suit the user. The cutting edge is made effective by grinding the edge at an angle, as shown. Undercutting the bottom face will allow the cutter to work to better advantage on an uneven surface.

## Locomotive Erecting Shop Platform

By H. H. HENSON

THE photograph shows a rigid and efficient scaffold which can be made at small cost for use in the erect-



Home-made platform for locomotive erecting shop.

ing shop. Such a scaffold is useful in installing running board brackets and doing other work in places that cannot be reached from the floor, and is particularly useful, when placed at the back of the cab floor after the cab, with the grab irons and step castings, has been removed.

The frame of the scaffold is of 1½-in. and 2-in. pipe, welded at the joints, and the platform is made of a section of 1½-in. boiler plate about 26 inches square. The platform is approximately five feet from the floor, and is reached by three steps on either side. The hand rail extends approximately

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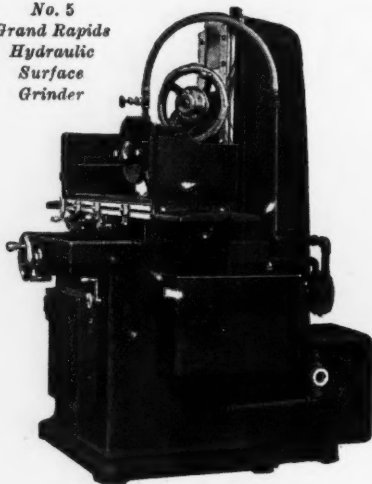
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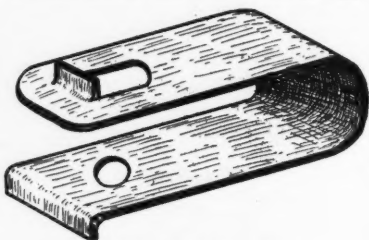
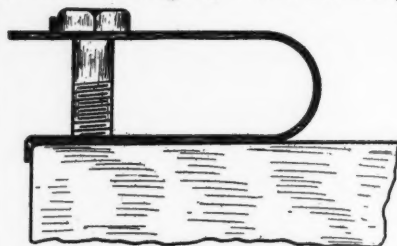
348 Straight Ave., S. W.  
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22 inches above the platform. Parts for such a platform can in most cases be made from scrap materials, and the cost of assembling and welding the parts together is negligible.

### A Simple Locking Clip

By R. H. CASPER

**A** MACHINE carried a number of screws which acted as stops for other machine members. While the conditions required that the screws be free enough so that they could be turned with the fingers, it was necessary



A simple locking clip.

that means be found for locking them so that they could not be turned by accident, or by the vibration of the machine. Experience showed that the conventional type of lock nut was unsatisfactory, consequently the clip shown in the illustration was developed. The bent end locks over the corner of the machine part and thus prevents the clip from turning, while the tab that is pressed out of the slot acts as a stop against the flat side of the screw head and prevents it from turning.



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## Over the Editor's Desk

### Obsolescence

**I**T is said that the U. S. Patent Office is issuing 80,000 patents a year. That means that at least 80,000 people have ideas for accomplishing something in a manner that is an improvement over the method formerly employed, either in the results obtained, or at a saving in either labor or materials. Add to this figure the number of new discoveries that are being brought to light every day by scientists and others, together with the changes in styles and methods of living, and the total will indicate one of the greatest menaces to modern business. That menace is Obsolescence! Obsolescence of product, and obsolescence of equipment with which to make the product. The product is obsolete when there is no longer a demand for it; when the manufacturer has failed to properly gauge the wants or necessities of his customers and has thus left an opening for a competitor to meet the demand. The equipment is obsolete when the cost of operation of such equipment is so high that the product can no longer be manufactured at a cost which enables the manufacturer to compete with others who have faster, better, and more accurate equipment.

Every live manufacturer is constantly watching the market to make sure that his product is as good or as cheap as that of his competitors, but how many are as constantly watching the equipment market for opportunities to make a larger profit or develop a larger market by selling at a lower price through the installation of better equipment? The 80,000 patents referred to above include hundreds covering easier and quicker methods of operating metal working machinery, most of which would undoubtedly return valuable savings to the

user. In fact, the question of purchasing an improved machine often resolves itself into a question—not of whether one can afford to buy it, but whether one can afford to be without it.

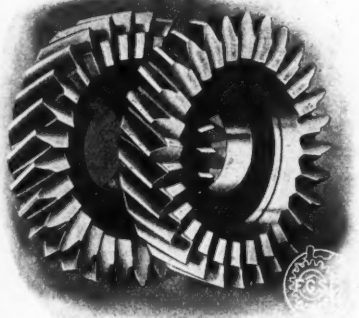
No manufacturer who is machining one piece at a time on a plain milling machine can possibly compete with the manufacturer who is using a double head or continuous miller. No man who is boring, facing, and threading duplicate parts with a single-point tool can compete successfully with the owner of a modern automatic lathe, equipped with special tools. No tool shop where the dies are hand-filed to shape can produce at the same low cost as the shop that is equipped with modern die-filing machines. And these are just a few elementary examples of progressiveness in comparison with a lack of it which will sooner or later lead to obsolescence. Those who cannot or will not keep up with the procession will eventually be left behind.

Obsolescence is just as much of a menace in the plant as it is in the salesroom.

### A Golden Opportunity

**B**USINESS is on the mend; there is no longer any doubt of it. Even the automobile plants, which were hardest hit of all, have put approximately 200,000 men to work within the last month. The general consensus of opinion among industrial leaders and bankers is that October will see the industries of this country on their feet again and well on the way to a normal, healthy condition.

Prices of all kinds, right at the present moment, are away too low. In a few weeks they will be much higher. Now is the time to estimate future requirements and lay in supplies of materials of all kinds, while the buying is good.



## Accuracy Is Only Relative

Original Gear Shaper Cutters, whether for cutting spur or helical gears, are made just as accurate as human ingenuity and skill can produce them, yet they are not perfect. Absolute perfection is impossible of obtainment.

Original Gear Shaper Cutters have been made by the Fellows Gear Shaper Company for over thirty years, and cutters made today are so much superior in quality and cutting ability that it has been possible for manufacturers using them to greatly improve the quality and reduce the cost of their product.

Do not be satisfied with anything but the best—it pays in the long run. Use Original Gear Shaper Cutters on your Fellows Gear Shapers and increase your profits.

Incidentally, if you are interested in learning more about the Gear Shaper process, write for a copy of our booklet, "The Practical Art of Generating." No obligations, of course.

## THE FELLOWS GEAR SHAPER CO.

78 River Street, Springfield, Vermont  
1149 Book Building, Detroit, Michigan

# "An Unusually Large

## TOLHURST MACHINE WORKS, INC.

SPECIALISTS IN

CENTRIFUGAL EXTRACTORS

TROY, NEW YORK

ESTABLISHED IN 1887

June 23d, 1930.

Mr. Don G. Gardiner, Publisher,  
Modern Machine Shop,  
128 Opera Place,  
Cincinnati, Ohio.

Dear Sir:-

Since we have been using Modern Machine Shop as one of our advertising media, we have been impressed by the number of inquiries traceable directly to it. Furthermore the inquiries have been "live" ones and an unusually large percentage of them have been converted into orders.

Very truly yours,

TOLHURST MACHINE WORKS, Inc.

By

*Geo. Sherrerd, Jr.*  
General Manager.

Geo. Sherrerd, Jr./C

Customers Throughout Open Barrels, Ammunition, and Cannon Beyond Our Control. Errors Subject to Correction. Operations Subject to Changes Without Notice.

# Percentage of Inquiries *Converted into Orders*"

SUCH is the experience of the Tolhurst Machine Works, Inc., of Troy, N.Y., with inquiries received from their advertising in MODERN MACHINE SHOP. Read their letter—it tells its own story. You, too, want *results*, so why postpone your decision any longer?

There is no better time to start an advertising campaign in MODERN MACHINE SHOP than *right now*. Business is on the "up and up" and most concerns are in a more receptive buying mood than they have been for several months.

You can't go wrong! So, be sure your advertising copy reaches us not later than Saturday, September 27th, and we will start your sales messages working beginning with the October issue.

**MODERN**  
*Machine Shop*

128 OPERA PLACE

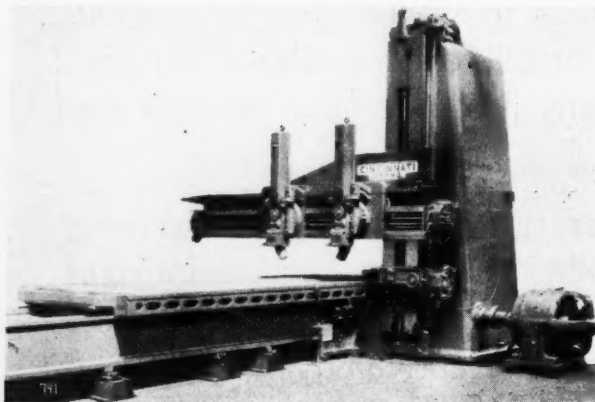
CINCINNATI, OHIO

## New Shop Equipment

### Cincinnati 96-In. Openside Planer

The planer shown in the illustration, which is a product of the Cincinnati Planer Co., Cincinnati, Ohio, is said to be one of the largest openside planers ever made in the United States. The

operate the mechanism involved are interlocked so that it is impossible to raise or lower the rail while it is clamped. If an attempt is made to raise or lower the rail while clamped, red lights appear on both ends of the rail. The lights can be seen from any position in front of the machine.



Cincinnati 96-in. Openside Planer.

machine has a capacity of 96 inches underneath the rail, and the left-hand head can square down a casting 125 inches wide.

The operation of the planer is completely controlled by push buttons. All heads are controlled by push buttons on the end of the rail and on the side head, and control is also obtained through a pendant switch which is easily accessible from the operator's position. These switches give the operator complete control of the movement of the table, as well as all movements of the heads and vertical adjustment of the rail.

The rail is clamped to the uprights by power supplied through an electric torque motor. Push-button switches control the operation of the motor for clamping and unclamping the rails and also engage the power for lowering and raising the rail. The two small motors which

Complete lubrication is supplied to the ways, gearing, heads, and other moving units by means of a pump, which insures that plenty of oil will be furnished to revolving parts and eliminates necessity for shutting down the machine to oil it.

The heads can be operated by rapid traverse independently of each other, and can be run together without causing any damage. The slides have a down feed of 40 inches below the bottom of the rail. Special toolholders provide for planing in pockets any distance within the capacity of the machine below the bottom of the rail.

The machine is of extra heavy construction in all parts, to insure rigidity when planing at the extreme end of the rail. Tests have shown that the left-hand head will plane a surface parallel with the setting of the rail. The approximate weight of the machine is 235,000 pounds, the main upright alone weighing 60,000 pounds.

### Hutto Model "MJ" Grinding Machine

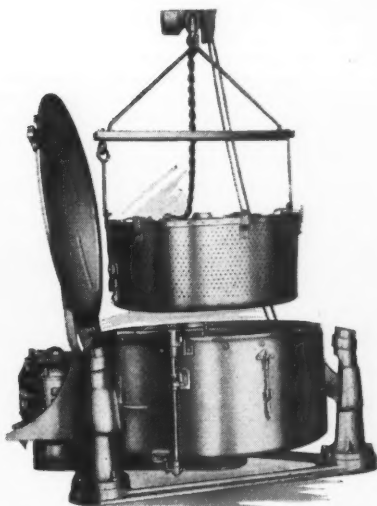
The Hutto Model "MJ" Grinding Machine, shown in the illustration, has been developed for the finishing of large work and is especially adapted to the grinding of cylinder bores up to 10 in. diameter with a maximum length of 55 inches. The operation is performed by the use of



# CUTTING OIL COSTS LESS EVERY TIME YOU USE IT

**T**HERE'S one sure way to save money on cutting oil. And that is: to buy less of it. You can make that saving, just as hundreds of other shops are making it, with Tolhurst Chip Wringers.

Tolhurst Chip Wringers, installed at a modest investment in the size that best fits your shop, whirl every possible drop of oil from your chips (in most shops, about 40 gallons per ton). They handle the longest, curliest turnings.



They require little power and only unskilled labor.

Let us give you a report on Tolhurst Chip Wringers for your shop — their cost — their operation. The coupon will bring the facts, without the slightest obligation.

# TOLHURST Chip Wringers

TOLHURST MACHINE WORKS, Inc.,  
646 N. Fulton Street, Troy, N. Y.

Gentlemen: Please give me the facts on Tolhurst Chip Wringers. We handle about

.....pounds of chips a day. The material is..... We prefer (line shaft) (individual) drive.

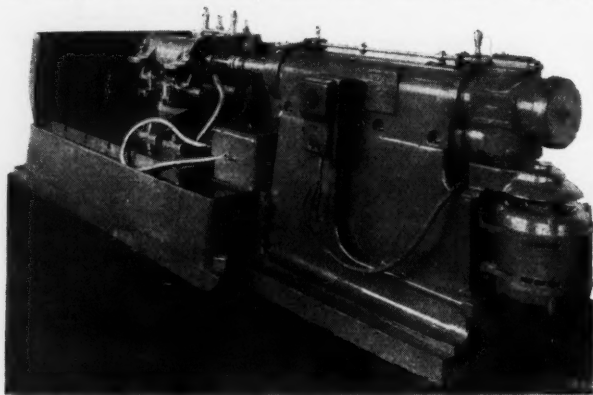
NAME .....

COMPANY..... ADDRESS.....

a Hutto grinder of suitable type and size for the work in process, the grinder revolving while the spindle reciprocates. A 7½ h.p. motor provides abundant power for all grinding operations within the capacity of the machine, and change speed gears provide three different traversing and revolving speeds.

The stroke of the machine is variable between 5 inches and 27 inches, the desired length of stroke being quickly and easily obtained by means of stops located on the horizontal reversing bar extending over the top of the machine. The stops automatically reverse the direction of travel of the spindle at each end of the stroke. However, a manually-operated lever permits reversal of the spindle at any point of travel, or the clutch may be thrown into neutral, permitting the grinder to dwell at any desired point. The spindle speeds are 100, 150, and 200 r.p.m., the ratio of reciprocating speeds to spindle speeds being 1 to 2.

The height of the table from the floor is 12½ in. and the height of the spindle from the floor is 32 inches. The overall dimension of the table is 40 x 86 in., with a working surface of 30½ x 65 in. The table contains five 1-in. T slots. A kerosene coolant reservoir of 35 gallons capacity is built into the table, and a filter, circulating pump and motor furnish a liberal supply of clean coolant. Ball bearings are used throughout and all

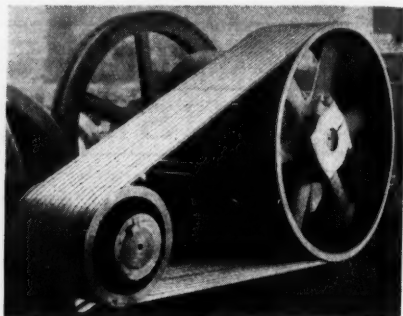


Hutto Model "MJ" grinding machine.

moving parts are immersed in oil, assuring long life. The net weight of the machine is 2,900 pounds.

## Worthington Multi-V-Drive

After months of study and experimentation in conjunction with the Goodyear Tire and Rubber Company, the Worthington Pump & Machinery Corporation, Harrison, N. J., has placed the Multi-V-Drive on the market. The drive consists of a number of endless, molded V-belts running in V-grooved sheaves, combining



Worthington Multi-V-Drive.

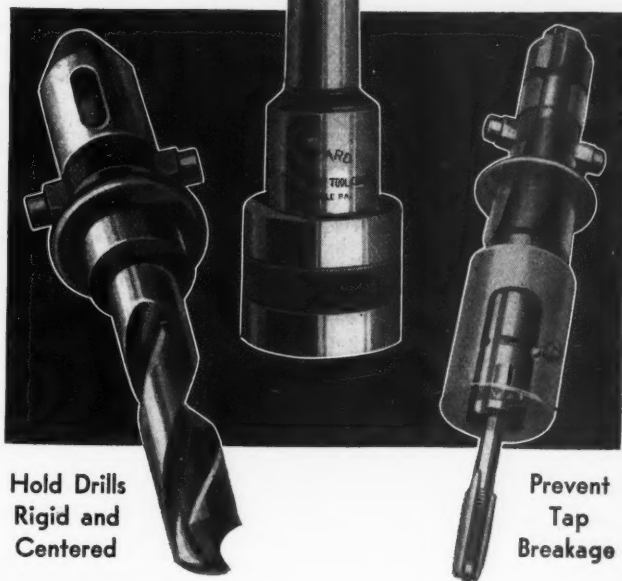
a new, long-life type of rubberized cord V-belt, impervious to dust and moisture, with an improved V-grooved sheave.

The Goodyear Emerald Cord Belts used in the Worthington Multi-V-Drive are said to combine, in the correct ratio, high power capacity, long flexing life, low stretch and accurate cross-section. The load-carrying members are high-grade cotton cords arranged in parallel lines and concentrated about the neutral axis. The rubber is of the highest quality and each belt in the Multi-V-Drive takes an equal share of the transmitted load. Each sheave is carefully grooved, machined and finished so that the grooves present a smooth surface on which the belts run. The wedging action between the belts and the grooves results in a slipless, powerful grip which compensates for, but differs from, initial belt tension in a flat belt drive.

The smooth-grooved construction of

# WIZARD

## Quick-Change Chucks and Collets



Hold Drills  
Rigid and  
Centered

Prevent  
Tap  
Breakage

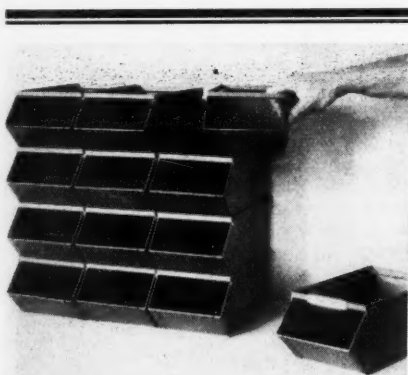
**T**IME studies show that with ordinary equipment for drilling and tapping, 75 per cent of the time is consumed in getting the tools ready and only 25 per cent in actually making holes. WIZARD Quick-Change Chuck Outfits cut this non-productive time by enabling the operator to change tools without stopping the spindle. WIZARD Friction-Drive Tapping Collets permit tapping at drilling speed. Our Bulletin No. 12-B will help you pick the WIZARD Outfit for your job. Send for a copy.

## McCROSKY TOOL CORPORATION

MEADVILLE

[Branches in Cleveland,  
Detroit, Chicago, Toronto]

PENNSYLVANIA



## Simplex Nesting Bins

are already saving their cost many times over in hundreds of shops by reducing handling costs.

For instance, on the assembly bench, Simplex Bins place many parts within easy reach of the workman. Twenty Simplex Bins four high can be stacked in a space  $15\frac{1}{2}'' \times 22''$  as compared with four times that space necessary to spread out twenty open pans of the same size.

Simplex Bins are sturdily constructed and nest deeply enough so that no amount of vibration will unstack them—they must be lifted out of each other.

Built in three standard sizes, but can be furnished in sizes to meet your particular requirements:

Bin No.	Width	Height	Length
1	$5\frac{1}{2}$ in.	4 in.	12 in.
2	$7\frac{1}{2}$ in.	$5\frac{1}{4}$ in.	15 in.
3	9 in.	$6\frac{1}{2}$ in.	$18\frac{1}{4}$ in.

## SIMPLEX TOOL CO.

WOONSOCKET

RHODE ISLAND

### SIMPLEX TOOL CO.

Woonsocket, R. I.

Kindly send illustrated circular describing and giving prices on the Simplex Nesting Bin.

Name .....

Title .....

Firm .....

Address .....

.....

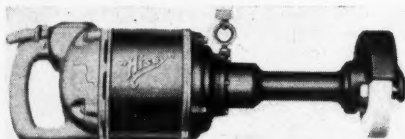
this drive, together with the fact that there is an exact mathematical relationship between the grooves and the molded shape of the V-belts, results in an effective conformity of belt to sheave which assures maximum power transmission efficiency. The combination gives a positive grip, without binding or backlash, which is said to transmit about 99 per cent of the applied power at high speed ratios, over short centers without idlers.

Among the advantages claimed for the Multi-V-Drive is the impossibility of sudden breakdowns, as each application is so engineered that, should one of the belts be ruptured, the remaining belts will carry the load until replacement is made. Other advantages claimed for this drive are high efficiency, quiet operation, neatness, small floor space, constant speed, elimination of idlers, lubrication and belt dressings, higher speed ratios, and freedom from breakdowns.

## "Hisey" Portable Hand Grinder

The illustration shows the new "Hisey" Portable Hand Grinder which the Hisey-Wolf Machine Company, Cincinnati, Ohio, is manufacturing in 1 h.p. and 2 h.p. capacities for both alternating and direct current.

The single phase alternating current machine, which may be operated directly from a lamp socket, is equipped with an improved commutating type repulsion in-



"Hisey" Portable Hand Grinder

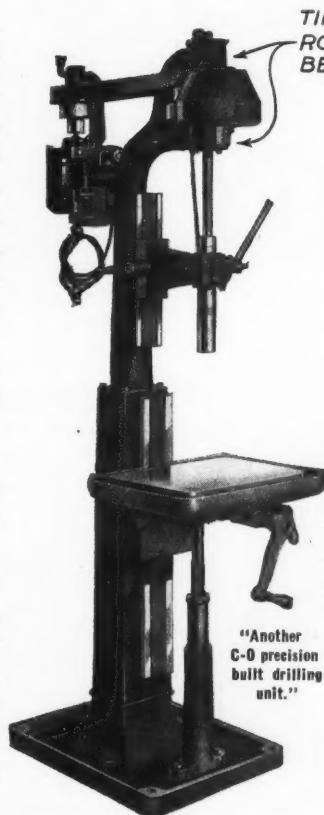
duction motor. This type of motor, unlike split phase motors, has no dragging centrifugal switch. It will start and pick up speed instantly under any load within twice its rated capacity. It is claimed that starting current under all conditions is unusually low and that low voltage has no objectionable effect on the single phase machine.

The manufacturer points out that the use of a 1 h.p. machine in conjunction with a 2 h.p. machine offers an unusual combination of economy and efficiency. When the original 10 in. diameter grinding wheel of the 2 h.p. grinder is worn to 8 in. it should be transferred to the 1 h.p. grinder operating at the higher speed, maintaining the original efficiency.

# This Floor Drill Comes To You Ready for the Job

That is the first cost-reducing feature of the Canedy-Otto 14" Sliding Head Sensitive Floor Drill. It comes to you complete—ready for your work by attaching to any convenient light socket. There is nothing extra to buy.

Another cost reducing feature of this machine is the vertical mounting of the motor. Mounting the motor vertically eliminates the need for idlers, pulleys, twist and turn belts, etc. Thus, this feature simplifies the power transmission problem and reduces the power necessary for the efficient operation of the machine.



**TIMKEN  
ROLLER  
BEARINGS**

This drill—a fast production machine

for holes from 0 to 1/2" —can be furnished either as a single spindle machine, or with multiple spindles in the floor or bench type. The cone pulley runs in Timken Roller Bearings and the spindle runs in thrust bearings, supported by a sleeve with an extra long bearing.

The spindle speeds are 400, 850, 1,750 r.p.m.; 525, 1,400, 3,000 r.p.m.; 1,000, 2,200, 5,000 r.p.m.; and 3,400, 5,600, 10,000 r.p.m.

"Another  
C-O precision  
built drilling  
unit."

Consult our Engineering Department on your drilling problems, whether regular or special.

CATALOG UPON REQUEST

**CANEDY OTTO**  
CHICAGO HEIGHTS, ILL.

New York Branch:  
407 Broome St.  
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Complete Stock At  
All Branches

San Francisco Branch:  
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San Francisco, Cal.

# CONNECTICUT BROACHES

*for better  
RESULTS!*



When you use a Connecticut combination round and spline broach you are assured of great savings in time, reductions in tool costs, and a more accurate job. These results are positive because this tool broaches the drilled hole to size, cuts the splines and removes the burrs in one operation.

You cannot afford to overlook these possibilities in your plant. Send us a description of your work and we'll recommend a broach that is guaranteed to give you better results!

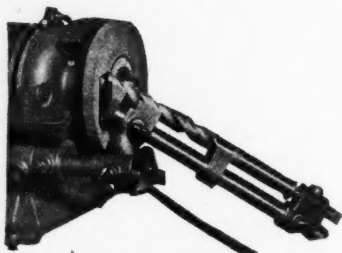
**The CONNECTICUT  
BROACH & MACHINE CO.**

NEW LONDON, CONN.

## Wappat Drill Grinding Attachment

In many places drill sharpening is done in a haphazard fashion without regard for correctness of lip angle, lip length and clearance. This results in drill breakage, waste of power, poor workmanship and loss of time.

To correctly grind all 2-lip drills, from the smallest size up to  $\frac{1}{8}$ -in. diameter, Wappat Incorporated, Electric Tool Divi-



Wappat Drill Grinding Attachment.

sion of Simonds Saw and Steel Company, has recently brought out a drill grinding attachment for use with its six-inch bench grinder.

According to the manufacturer, mechanical skill is not required to operate this device because it is simple to operate and is fool-proof. The adjustments for varying diameters and clearances can be made easily and accurately. It is substantially built, and will not get out of adjustment.

The grinder is mounted on ball bearings and the abrasive wheels are perfectly balanced to eliminate the possibility of vibration. Rubber feet contribute to the quiet running and accuracy of this device.

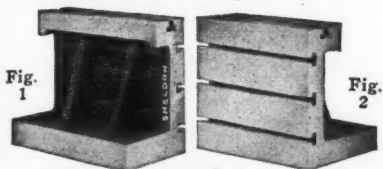
## Swedish Gage Co. Inside Diameter Gage

The Swedish Gage Company of America, Detroit, Michigan, has recently placed on the market an inside indicator gage for checking the diameter, taper and out-of-roundness of deep holes.

The manufacturers say that due to the unique construction of the centralizing mechanism, the indicating anvils will always be located diametrically. The indicator scale is graduated in thousandths and ten-thousandths. The graduations are of sufficient width to detect variations in diameters of .00005 in. The



## Sheldon 90° Angle Plates

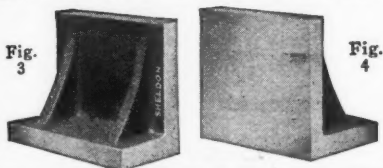


These Plates are made of semi-steel, heavily ribbed, insuring close-grained, rigid castings.

With Second Face and T Slots

No.	Size Face	Size Top	Size Base	T Slots	Wt., Lbs.	Price, Each
1T	3 3/4 x 5	1 1/2 x 5	2 1/2 x 5	4 - 1/4"	5	\$10.00
2T	6 x 7	2 1/2 x 7	4 1/2 x 7	4 - 1/2"	20	15.00
3T	8 x 9	3 x 9	6 x 9	4 - 1/2"	38	20.00
4T	10 x 12	3 1/2 x 12	7 3/4 x 12	4 - 5/8"	75	30.00
5T	14 x 16	4 x 16	9 x 16	4 - 5/8"	170	45.00

## SHeldon 90° PLAIN ANGLE PLATES



No.	Size Face	Thickness Face	Size Base	Wt., Lbs.	Price, Each
1P	3 3/4 x 5	1/2	2 1/2 x 5	4	\$ 8.00
2P	6 x 7	3/4	4 1/2 x 7	15	10.00
3P	8 x 9	1	6 x 9	30	14.00
4P	10 x 12	1 1/4	7 3/4 x 12	60	20.00
5P	14 x 16	1 1/2	9 x 16	145	30.00

## Sheldon "Set-Up" Jacks



## PLANER JACKS (Fig. 1)

No.	Height, Contracted	Height, Extended	Diam., Screw	Weight, Lbs.	Price, Each
1	2 3/4	3 3/4	7/8	1 1/2	\$1.25
2	3 3/4	5 1/4	1 1/8	3	2.10
3	5 1/4	7 1/2	1 1/4	6	3.00
4	7 1/4	12	1 1/2	12	6.00

## VERTICAL JACKS (Fig. 2)

No.	Height, Contracted	Height, Extended	Diam., Screw	Weight, Lbs.	Price, Each
1	2 3/4	4	5/8	1 1/2	\$ .75
2	4	7 1/2	3/4	2	1.10
3	6 3/4	12	3/4	5 1/2	1.70
4	8 3/4	15	1	7	2.50

## BRACING JACKS (Fig. 3)

No.	Height, Contracted	Height, Extended	Diam., Screw	Weight, Lbs.	Price, Each
1	3 3/4	6	5/8	1	\$ .65
2	4 3/4	8	3/4	2	1.00
3	6 3/4	12	3/4	3	1.50
4	8 3/4	16	3/4	4	2.10

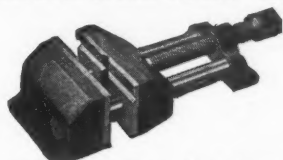
## Sheldon Milling Machine Vises



Furnished Both Plain and With Swivel Base.  
SPECIFICATIONS AND PRICES:

No.	Width of Jaws	Depth of Jaws	Jaws Open	PLAIN VISE		SWIVEL VISE	
				Wt., lbs.	Price	Wt., lbs.	Price
3	3 1/2"	1 1/2"	2 1/2"	15	\$16.00	25	\$20.00
4	4 1/2"	1 1/2"	3 1/2"	30	\$20.00	45	\$24.00
6	6 1/2"	2"	4 1/2"	70	\$30.00	90	\$40.00
8	8 1/2"	2 1/2"	7"	160	\$45.00	225	\$60.00

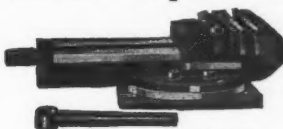
## Sheldon Drill Press Vises



Guide Bars are Hardened and Ground.  
SPECIFICATIONS AND PRICES:

No.	Width of Jaws	Depth of Jaws over Guide Bars	Full Depth of Jaws	Jaws Open	Wt., lbs.	Price
D 4	4 1/2"	1 1/2"	3"	4"	15	\$12.00
D 6	6 1/2"	1 1/2"	3 1/2"	6"	35	\$18.00
D 9	9"	2 1/2"	4 1/2"	9"	70	\$24.00

## Sheldon Shaper Vises



SPECIFICATIONS AND PRICES:

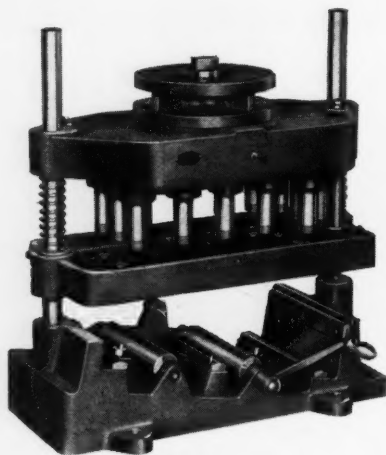
No.	Size of Jaws	Vise Opens	Bolt Hole Spacing*	Wt., lbs.	Price
1	12" x 2 1/2"	12 1/2"	7 1/4"	175	\$120.00
2	18" x 2 1/2"	18 1/2"	8 1/2"	240	\$135.00

\*Distance between holes can be changed without additional charge.

Write for Catalog Describing Full  
Line of SHELDON Tools  
For the Machine Shop

**SHELDON MACHINE TOOL CO.**

3251 Cottage Grove Avenue, CHICAGO, ILL.



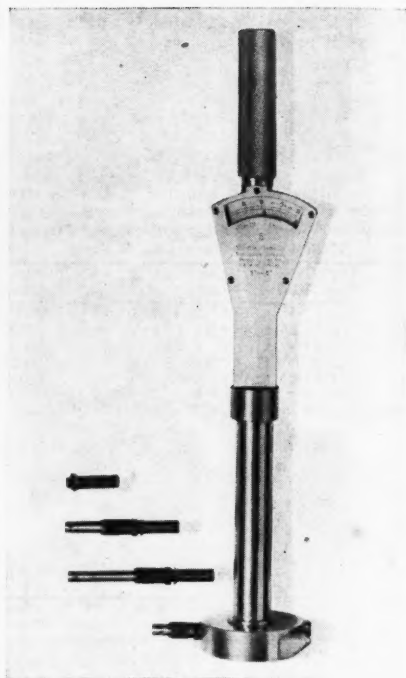
## Worthwhile Savings!

**T**OOL SETUPS, as illustrated here, consisting of a Snyder ball bearing multiple drill head, bushing plate and work holding fixture contribute greatly not only to the reduction of production costs, but also to savings in investment by reason of the fact that *they can be adapted to standard low price, single-spindle drilling machines, converting them at very little expense into multiple spindle machines.*

Investigate their possibilities before buying. Call on Snyder engineers for suggestions and prices.

## Snyder Tool & Eng. Co.

3400 E. Lafayette Avenue  
DETROIT, MICHIGAN



No. 5L Swedish Inside Indicator Gage.

gaging anvils are hardened, ground, and lapped. When desired, anvils tipped with diamonds or tungsten carbide can be furnished. The gage is made in two sizes—No. 3L and No. 5L.

## Hercules Interchangeable Punches and Retainers

Whitman & Barnes, Inc., Detroit, Michigan, announces the development of a system of interchangeable punches and retainers which makes it possible to change punches as easily as a drill is changed in a drill press, and without the necessity of removing the die from the press. The other advantages claimed for the system are: (1) lower die-building costs, (2) easier and quicker set-ups, (3) reduced "down-time" for die repairs, (4) time lost through broken punches eliminated, (5) lower die maintenance costs, and (6) stabilized and increased production.

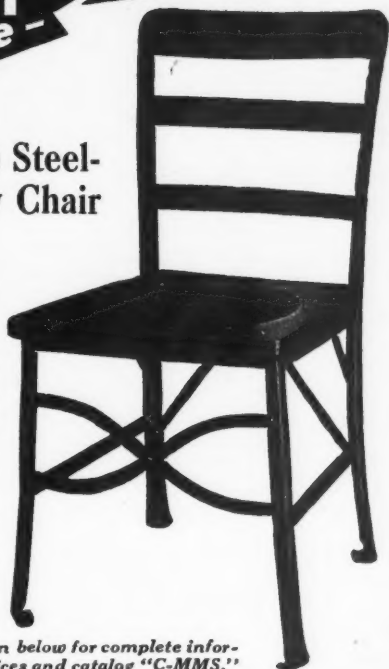
The Hercules Interchangeable Punch System consists of a removable punch

# FOR PROFIT and permanence -

## ... an all-purpose Steel- Wood Factory Chair

SAVE  
WITH  
STEEL

**T**HOUSANDS of these chairs are now in daily use in every type of manufacturing industry the country over. They are adaptable to so many uses and places that many manufacturers find it economical to buy them in quantities. Frame is built entirely of steel. Riveted construction and finished in baked olive-green enamel. Hardwood saddle seat,  $14\frac{1}{2}" \times 14\frac{1}{2}"$ . Finished in light oak or mahogany. Height ranges of 16 to 26" in six heights. Unusually durable, economical and all-purpose use. Sturdily braced front and back with rigid steel stretchers. Triple steel backrests are attached to continuous steel posts. Ball turned feet.



Mail coupon below for complete information, prices and catalog "C-MMS."

CIRCLE THOSE

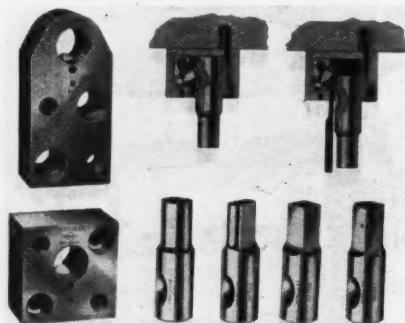
Mr. \_\_\_\_\_

ITEMS INTERESTED IN, Position \_\_\_\_\_

SIGN YOUR NAME, PIN TO LETTERHEAD

 ALL STEEL CABINET	 ALL STEEL TABLE	 FURNITURE 11-14	 LODGER BENCH	 BENCH DELIVER	 ALL STEEL BENCH	 TOOL CABINET	 ALL STEEL CABINET
 STOOL	<b>ANGLE STEEL STOOL CO.</b> Manufacturers of Angle Steel and Sheet Metal Equipment <b>PLAINWELL MICHIGAN</b>						 CHAIR
 FURNITURE 15-18	 BENCH 15-18	 L.H. DESK	 MACHINE TABLE	 MACHINE TABLE	 BENCH 18-20	 BOX 18-20	 BOX 20-22

held in a retainer by a detent (latch or pawl) acting in an arcuate recess in the shank of the punch. The punch is instantly released when the detent is



**Hercules Interchangeable Punches and Retainers.**

pushed upward out of the recess by an extractor pin working through the retainer block. The detent in the Hercules Retainer has liberal surface contacts at both ends, which, under test, have shown no indication of wear after long runs. Furthermore, because of the minimum

wedging action set up between the detent and the punch, successive punching and stripping forces will not cause the punch to stick or the retainer to split.

The detent supports the punch and takes out all possible longitudinal movement, thus keeping it in perfect contact with the backing plate at all times. In the operating position it transmits the stripping strain from the punch to the retainer through a line that is at a 60-degree angle to the axis of the punch. Therefore, for every 100 lb. of stripping strain introduced when the punch is removed from the metal, it is said that only 200 lb. transverse strain is transmitted to the retainer through the detent.

Hercules Punch Retainers are made in square and rectangular types to take punches of sizes most commonly used in standard punch practice. The square type retainer is used wherever space and center distances permit. Closer center distances are obtained by combining the square with the rectangular type or by using the rectangular type exclusively. Hercules Interchangeable Punches are made and stocked in common-use sizes in round, oblong, square, and hexagonal piercing points. Each punch and retainer are standard as to dimensions and are entirely interchangeable. They are

## WHITON LATHE CHUCKS

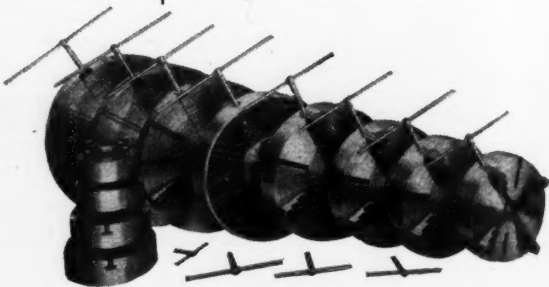
*For  
a Sure Grip!*

**W**HEN work must be held rigidly and securely for accurate machining at top speeds—WHITON Lathe Chucks prove their superiority!

WHITON Chucks—and there's one for every requirement—are good chucks. Their design and workmanship assure you dependable service over a long period of time.

Get a WHITON Catalog—it shows the complete line of WHITON Chucks as well as many special chucks built for special requirements.

*Here is a group of WHITON Steel Body Independent Chucks designed to hold heavy work under heavy cuts at high speed. The one-piece body resists sudden strain.*



**THE D. E. WHITON  
MACHINE CO.**

NEW LONDON CONN.

# ...EASY CONTROL.....

STARTING AND STOPPING IS ALMOST INSTANTANEOUS

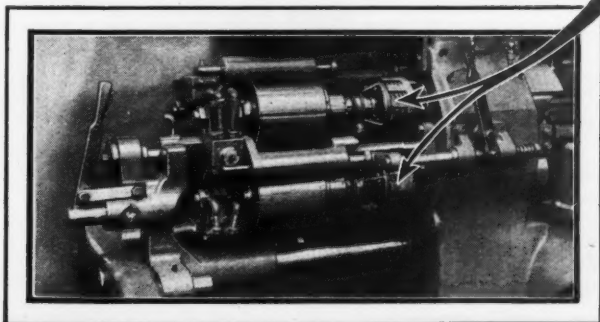
Rapid roughing and accurate finishing of castings, forgings, stampings, bar stock, etc., is the job of the Model "H" Gridley Four Spindle Automatic Chucking Machine... and it has been designed "from the ground floor up" to do it.

Spindle control... the National Acme Company's designers decided... could be handled best by a Twin Disc, dry plate type, Machine Tool Clutch. No chance for sticking... and one or two spindles can be stopped instantly in any of four positions.

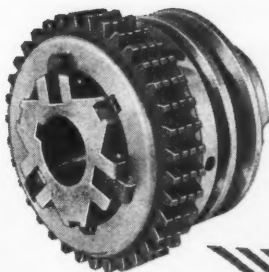
More and more machine designers are solving the control problem with the Twin Disc Machine Tool Clutch. It combines capacity with compactness... smoothness of performance with greater adaptability... and it meets modern methods of design with a size and type for practically all machine tool requirements. 2, 2½, 3, 3½, 4, 4½, 5, 5½, 6, 7 and 9 inches effective diameters; single or duplex; oil or dry plate.

Write for Engineering Data Book. Specific recommendations gladly furnished by our Engineering Research Department on request. *Twin Disc Clutch Company, Racine, Wisconsin.*

**TWIN DISC**  
CLUTCHES



*Single "CC" Type  
Twin Disc Clutch,  
with compressed  
asbestos gear tooth  
driving plates used  
when clutch runs  
dry.*





**Balance, strength and a stubborn resistance to wear built into Maydole Hammers makes them outlast ordinary hammers for shop work.**

*Your dealer has the weight you like. Write us for a free copy of Pocket Handbook 23 "P" containing useful information for machinists.*

**YOUR HAMMER SINCE 1843**  
**Maydole**  
**Hammers**

**The David Maydole Hammer Co., Norwich, NY**

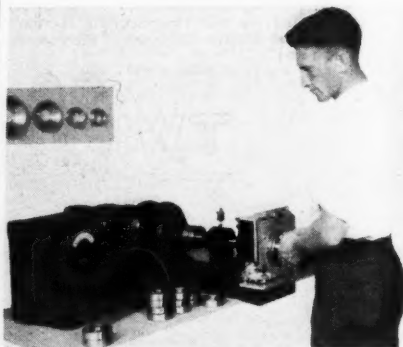
made to precision limits, with all important surfaces ground after heat treating. A superior quality of vanadium steel is used for these parts, and the punches are heat treated by precision methods in electric furnaces, insuring uniformity.

The tolerance on the diameter of the punches is plus .000, minus .001 in. and the back taper is from .001 to .002 in. in length of the piercing end. All stock punches are ground flat on the piercing end and exactly perpendicular to the axis of the punch, which is satisfactory for the average thickness of sheet. On heavy plate it has been found that a conical or wedge-shaped point improves the performance of the punch. The angle of this point or wedge may be varied from 10 to 15 deg. on a side, which represents the stock removed from the flat piercing end.

The Hercules Interchangeable Punch System is applicable to practically all punching operations. The retainers mount on standard die sets and the punches are aligned with regular die buttons.

### **Burgess Bearing Tester**

In order to accurately determine the quality of ball and roller bearings, the C. F. Burgess Laboratories, Inc., has developed a bearing tester with which bearings can be tested by scientific



**Burgess Bearing Tester**

means. The tester is being marketed by the Burgess-Parr Company, Room 1804, 111 West Monroe Street, Chicago, Ill.

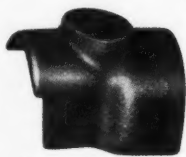
The Burgess Bearing Tester is an acoustimeter designed to detect the undesirable vibrations of a bearing, which is accomplished by means of an elec-



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# Improve Your Product *with* **PRESSED METAL!**

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**T**ODAY, as never before, Industry is turning to pressed metal to improve its many products. Everywhere . . . from vacuum sweepers to heavy machine tools . . . pressed metal parts are making good!

And they'll make good in your product also. One or two parts made of pressed metal may save you thousands of dollars by eliminating expensive machining operations, reducing weight, saving labor and breakage.

Others have improved their products with pressed metal, perhaps you can, too. Metal Specialty engineers will tell you. Just send your parts list or catalog. There's no charge for this service.

## **The Metal Specialty Co.**

1530 SIXTH ST., WEST

CINCINNATI, OHIO

---

trical pick-up and amplifying circuit and an electrical meter to indicate the relative amounts of vibration of various kinds and types of bearings. The method of testing is simple, direct, and fully as rapid as the more antique method of listening to the noise of the bearing in operation and trying to detect flaws by ear. The instrument is so adjusted that flaws are immediately indicated by a deflection of the needle. The amount of deflection determines the quality of the bearing.

The instrument is constructed so that only the vibrations indicative of bearing quality will affect the meter reading. Thus extraneous noises and the mechanical vibrations which have no bearing on the quality of the bearing are ignored, which makes it possible for the tester to be located in the factory and eliminates the necessity for a sound-

proof room. It is claimed that the Burgess Bearing Tester not only provides means for testing bearings more consistently and accurately than ever before, but also that the time required for testing is much shorter. The tester can be operated by a girl or other unskilled labor, and is adaptable to a wide range of ball and roller bearings.

## Bradford Three-Head Production Machine

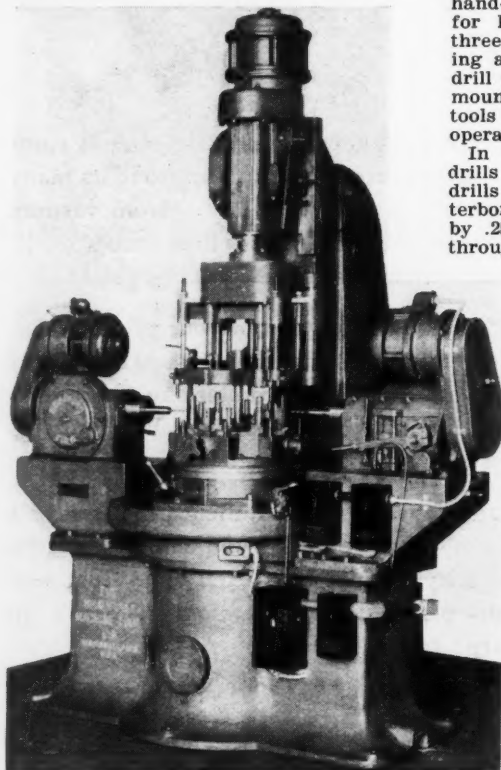
The illustration shows a three-head machine that has been developed by the Bradford Machine Tool Company, 659 Evans Street, Cincinnati, Ohio, with special tooling equipment for machining the pump body of an electric refrigerator. The tooling equipment consists of four work-holding fixtures mounted on a hand-operated turret. One station serves for loading and unloading, the other three stations being equipped for drilling and reaming. The horizontal units drill single holes while the cluster box, mounted on the vertical head, carries tools in three groups to match the three operating stations of the turret.

In this installation the vertical unit drills and reams two holes .372 in. dia. drills two holes .281 in. dia., and counterbores the two .281 in. holes to  $\frac{1}{4}$  in. by .258 in. deep, all holes being drilled through 1020 S.A.E. steel,  $1\frac{1}{4}$  in. thick.

The horizontal units drill two  $\frac{1}{4}$ -in. holes through  $\frac{3}{4}$  inch of stock. A cutting speed of 90 ft. per min. and a floor-to-floor time of 19 seconds per piece is obtained.

The machine is readily adaptable for production work by changing the tooling equipment. Multiple spindle cluster boxes may be mounted on the horizontal units and the turrets may be arranged for automatic indexing if necessary. Each unit is equipped with individual motor drive and an additional motor is provided to operate the pump for the coolant supply system. Each motor is provided with an independent switch having overload and underload protection. The starting and stopping of the entire machine is controlled through a single push button.

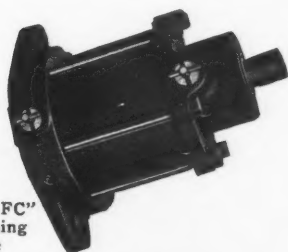
The feeding mechanism is controlled by means of a hand-operated poppet valve, mounted



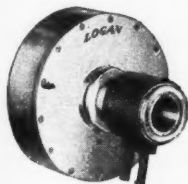
Bradford Three-Head Production Machine.

# LOGAN

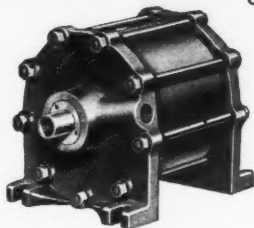
## AIR CYLINDERS



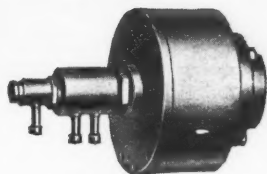
Model "FC"  
Cushioning  
Type



Model "J"  
Hollow Center  
Rotating Type

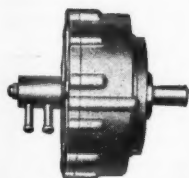


Model "B"  
Non-Rotating Type

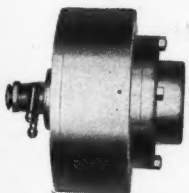


Model "T"  
Coolant thru center  
Rotating Type

*Give the kind of Service  
you have always wanted!*



Model "K"  
Aluminum Rotating  
Type



Model "R"  
Rotating Type

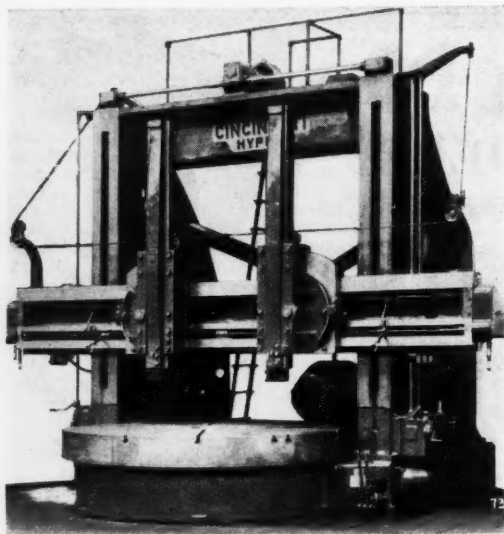
THOUSANDS of concerns have found that "LOGAN" Air Cylinders behind their air operated devices gives them quick action with plenty of power and assures increased production at lower costs.

That is the kind of service you get from every "LOGAN" Air Cylinder—the kind of service you have always wanted in your shop. Such service is made possible by the many outstanding features incorporated in the "LOGAN" design.

Some of these features are: enlarged air inlet and outlet for quick operation, heavy construction throughout for increased air pressures and the self-adjusted by air packings for eliminating all hand adjustments.

"LOGAN" Air Cylinders are built in many sizes and types to meet various requirements. Catalog S-25 tells the whole story. Be sure you get your copy—write for it today!

**The Logansport Machine Company**  
LOGANSFORT, INDIANA



Redesigned Cincinnati 10-ft. Boring Mill.

near the front of the table, which connects with air-operated trip dogs, at-

surings a smooth rolling action. Herringbone gears are used for the drive

tached to the feeding levers of each unit. All spindles advance simultaneously in rapid traverse, automatically slow down to the proper feed rate, and upon completion of the operation return in rapid traverse to the starting point. As the operator reloads the fixture while the machine is operating, the only time lost is the time required for indexing—which is limited to one second.

### Cincinnati 10-Ft. Boring Mill

The Cincinnati Planer Company, 3100 South Street, Cincinnati, Ohio, has redesigned its 10-ft. boring mill to incorporate several features which have never before been embodied in the construction of a machine of this type. The table is now driven by an internal spur gear which is driven, in turn, by hardened spiral bevel gears. The spiral bevel gears are mounted in ball bearings, insuring a smooth rolling action. Herringbone gears are used for the drive

## AMERICAN V-2 Broaching Machine

**SMOOTH - POWERFUL  
ACCURATE - PRICED RIGHT**

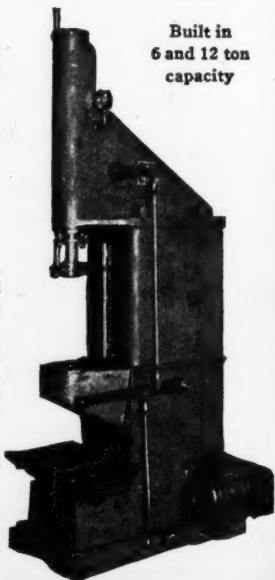
**H**YDRAULIC PRESSURE is smooth acting, positive, and powerful—the ideal for accurate broaching. That is why the American V-2 Broaching Machine is equipped with hydraulic feed.

It gives the ram a steady, smooth, downward stroke, and at a speed of 20 feet per minute has enough reserve power, up to 6 tons, to complete the stroke at this speed. As soon as the stroke is completed the ram automatically returns to the starting position.

This feature and many others are completely described in our bulletin—write for it TODAY!

**The American Broach & Machine Co.**  
ANN ARBOR MICHIGAN

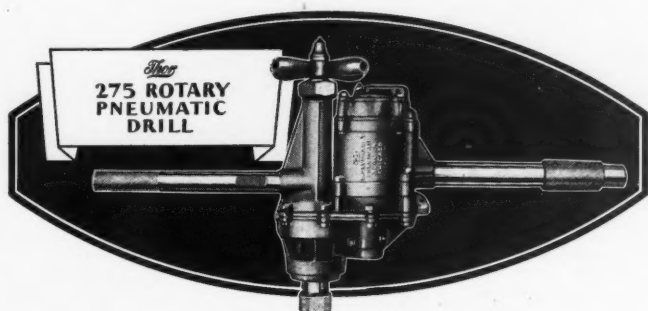
Built in  
6 and 12 ton  
capacity



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# Thor

## 275 ROTARY AIR DRILL



### *The Most Powerful and Efficient Drill of Its Size*

THE Thor 275 Drill was designed to eliminate the mechanical inefficiency in piston type drills, which eat up power and have speed limitations, due to the reciprocating motion of pistons, connecting rods and valve gear. In the Thor 275 Rotary Drill, there are no inertia forces to overcome in starting and stopping pistons and connecting rods over top and bottom centers of the crank motion.

The 275 is a one-man drill and operates without vibration. One of its features is that it runs practically at free speed up to one-half its maximum load, thus giving constant working speed

throughout that range. Between holes, the 275 does not race, but because the speed and air are governed, it idles along, consuming only a minimum amount of air.

Because of its construction it gets in close at the side without removing the dead handle. This makes possible close quarter drilling and reaming at a much greater speed.

A demonstration in your shop will quickly prove these many advantages.

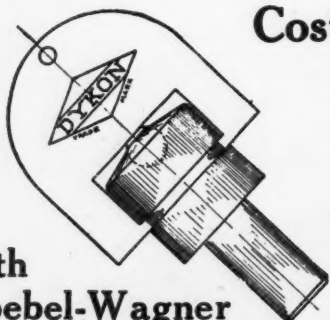
Specifications: Drilling capacity, 1½ inches. Reaming capacity, 1⅞ inches. Speed, 380 R.P.M. Weight, 36 lbs.

**INDEPENDENT  
PNEUMATIC TOOL CO.**

*New York* ..... **TOOLMAKERS** ..... *London*  
**PNEUMATIC TOOLS • ELECTRIC**  **TOOLS • AIR COMPRESSORS** ..... *SINCE 1893*

236 S. JEFFERSON ST. CHICAGO, ILLINOIS

## Cut Your Grinding Costs



### with Koebel-Wagner DIAMONDS!

**ARE** your precision grinding wheels doing precision work . . . or, are they dull and unevenly worn? The point is that unless you keep them true and smooth, precision work cannot be obtained at reasonable costs!

Koebel-Wagner Diamonds will true your wheels better — quicker — and with less waste. Each diamond is set in a Safety-Mounting which securely holds the stone in place and prevents loss. These diamonds are protected against abuse by the "Dykon" Gage. This is a small Koebel-Wagner Device which indicates at once when the diamond is worn to its lowest level and requires resetting. Scores of leading manufacturers throughout the country have found that the use of Koebel-Wagner diamonds lowers their grinding costs and gives better results. These diamonds will lower your costs as well . . . let us show you how . . . send the coupon TODAY!

### Koebel-Wagner Diamond Corp.

144 ORANGE ST. NEWARK, N. J.

1200 Oakman Blvd., Detroit, Mich.

310 Citizens Bldg., 850 Euclid Ave.,  
Cleveland, Ohio

New York, Indianapolis, Chicago,  
San Francisco

Koebel-Wagner Diamond Corp.  
144 Orange St., Newark, N. J.

How can I cut my grinding costs by using K-W Diamonds?

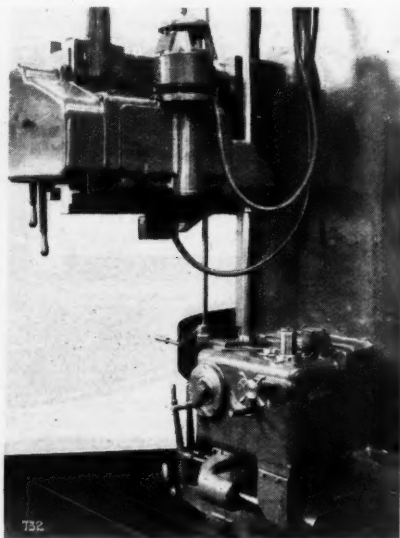
Name .....

Firm .....

Address .....

City.....State.....

from the motor to the speed box. A four-speed transmission is used with the variable speed motor, or, if a constant speed motor is used, a gear box will be supplied with a set of gears with which nine speeds can be obtained. The gear



Heads are operated by motors at either end of the rail.

box is rigidly mounted between two extensions.

Power to operate the heads is supplied by small motors mounted on either end of the rail, and controlled by push buttons convenient to the operating position. By moving a lever, power can be applied either for the regular feed or for rapid traverse. The heads are independent of each other and each has its own feed gear box. The rail is raised and lowered by the operation of a motor that is located on the top of the machine and controlled by a push button, also convenient to the operator. The motors are interlocked so that it is impossible to raise or lower the rail while it is clamped. All movements of the table, heads, or rail, as well as the rail-clamps, are controlled from the operator's position. The complete line of Cincinnati boring mills are designed similar to the machine shown in the illustration. Side heads may be applied if desired.





### The OLIVER Pays Its Way!

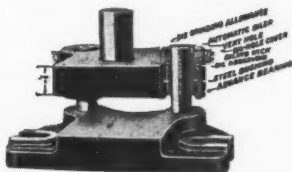
The OLIVER Die Making Machine will save at least 50% of your high-priced tool-makers' time on practically any sawing, filing or lapping operation. Made in several models to meet varying conditions, their small cost is quickly absorbed by their many cost cutting economies. We also manufacture Drill Pointers, Point Thinners, Tap and Cutter Grinders.

Send for bulletins today.



THE OLIVER INSTRUMENT CO.  
1430 Maumee Street, Adrian, Mich.

## BAUMBACH *Automatically Oiled* DIE SETS



Standardized die sets, embodying many exclusive features, and a listing of 70,000 stock sizes afford a service that is unsurpassed.

*Your Inquiries Solicited*  
Send for New 120 Page Catalog

**E. A. Baumbach Mfg. Co.**  
1806 S. Kilbourne Ave. Chicago, Ill.

## USE A POWELL BLOW-GUN AIR VALVE TO

*blow your turnings  
or borings away*

# BLOW- GUN



*An  
interchangeable nozzle  
tip for every purpose*

# POWELL VALVES

*The WILLIAM POWELL Co., Cincinnati, Ohio*



## *Built like--- --- a fine watch!*

Compare the construction features of FEDERAL Gauges with those of any fine watch . . . and you'll find many features are the same.

For instance:

- the main bearings of Federal Gauges are jeweled
- the movement is a separate unit which insures perfect alignment of the gears
- the entire movement can be removed for cleaning or repairs
- the compound movement permits the use of a strong 40-tooth rack gear
- the rack is chromium plated to insure longer wear and prevent sticking from corrosion
- the case is die cast and has no soldered joints to come loose
- and the stem is cast integral with the case—it cannot come loose.

These features help make FEDERAL Gauges the finest gage that you can buy. The FEDERAL Catalog tells the whole story—send for your copy today.

**FEDERAL**  
**PRODUCTS CORP.**  
PROVIDENCE, RHODE ISLAND

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10,000 Euclid Ave.

Detroit, Mich.  
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Chicago, Ill.  
549 W. Washington  
Blvd.  
New York, N. Y.  
50 Church St.

## **New Flexible Shaft Features Developed By U. S. Electrical Tool Company**

Several features which are said never to have been offered before in flexible shaft equipment are now made available by The United States Electrical Tool Co., 2471 West Sixth Street, Cincinnati, Ohio. One of these features is the patented "V-disc" speed changer, which can be seen in the illustration. Attached to any standard "U. S." flexible shaft machine, it provides eight different speeds at from 1,000 to 11,000 r.p.m. Changing from one speed to another is accomplished in less than a second, and it is said that the



"U. S." Electrical Shaft Equipment.

selection of the proper speed lengthens the life of rotary files and grinding wheels.

Another new feature is a simple copy-righted speed chart by which a mechanic can tell at a glance which tool and which speed are proper for any job on any kind of metal. This chart is furnished with each "U. S." flexible shaft machine.

Many improvements are also embodied in the shaft and casing. Both are more flexible. The casing expands and contracts, allowing for stress and absorbing the strains that heretofore have been thrown onto the shaft or core. Stress is further relieved by a slide coupling at the motor end of the casing. The shaft



## NIELSEN LIVE CENTERS

*Improve Lathe Accuracy!*

Equip your tailstocks with Nielsen Ball Bearing Lathe Centers... they improve the accuracy of your lathe and allow you to work to closer limits. The long spindle and bearing arrangement keeps the center-point in perfect alignment, eliminating all

danger of the work wobbling while under cut.

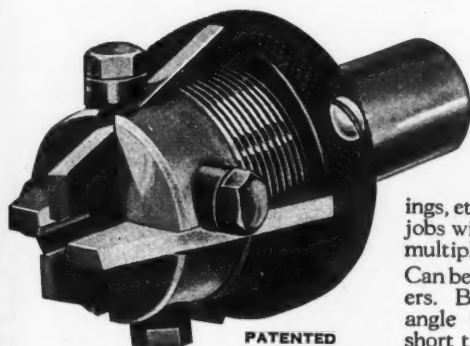
Thus, you can increase production, save time, and cut costs by using Nielsen Live Centers. There's a Nielsen Center for every need, too ... write for a bulletin!

≡ (NIELSEN, INC.) ≡  
LAWTON, MICHIGAN

Foreign Representative: Gaston E. Marbaix, Ltd., Adelaide House, King William Street, London, E. C. 4

## Genesee Adjustable Hollow Mill

Made in 7 different styles



PATENTED

Has adjustable, replaceable blades and can be replaced at nominal cost, making it unnecessary to continually buy new tools.

The ideal tool for finishing your forgings, castings, etc. Do your several operation jobs with Genesee inserted blades multiple operation tools.

Can be fitted with drills and reamers. Blades can be ground any angle to point work and turn short tapers.

*A Genesee Adjustable Hollow Mill can be made for every job*

WRITE FOR CATALOGUE

**GENESEE MANUFACTURING CO., Inc.**  
ROCHESTER, NEW YORK

is made of piano wire wound cold under uniform tension, each layer wound in the opposite direction from the layer next to it, and progressing in size from the center to the outside to insure equally-distributed torque. It is fastened rigidly to the motor, carries ample lubrication, and has a coil bearing inserted between itself and the casing. The hand piece turns on ball bearings in a grease-tight compartment. It is especially-designed to assure easy handling and accuracy, to run cool, and to run free from vibration.

The equipment is available in sizes from  $\frac{1}{4}$  h.p. to 3 h.p. inclusive, and in all styles of mountings including overhead, vertical, trolley, floor or stand, bench or horizontal. It is divided into three models: engravers', die sinkers' or form filing models, and heavy duty models.

### Grob No. 1 Filing Machine

The filing machine shown in the illustration has been developed by Grob Brothers, Ninetieth Street at National Avenue, West Allis, Wis., for use in connection with the manufacture of dies, special tools, and other work in which precision filing is required. The feature

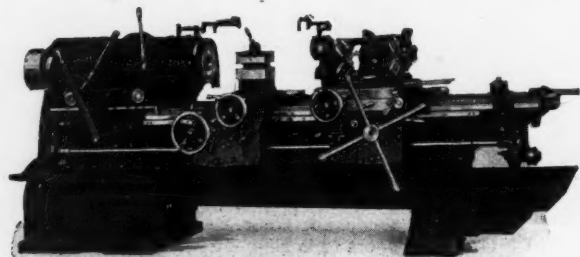
of the machine is the continuous cutting action.

The frame of the machine is of semi-steel and is of rugged design. The table front guard and slide, and drive units are attached to the table. The motor is mounted on a bracket attached to the rear of the frame. The filing table, which is 16 x 20 in., is coupled to the table by two hinge-pins, arranged so that the table may be tilted in either direction. A table-angle of  $22\frac{1}{2}$  degrees can be obtained. An indicator finger, attached to the table, provides an accurate and positive means of setting the table to any desired angle.

The continuous file chain is made up of a series of links which operate on two sheaves, one of which—the driver—is located in the base of the machine while the other, which is the idler, is located in the head. Adjustment to compensate for correct filing tension is obtained by operation of a handwheel, located at the top of the head, which controls the tension of a heavy helical spring. The spring also acts as a cushion for the purpose of maintaining a uniform drive. Either flat, half round, or special files can be used with the machine and the change from one file to another can be made easily and quickly.

## No. 3 Acme Heavy Type Universal Turret Lathe with DUO CONTROL

Higher operating efficiency, together with simplified design, makes this Acme Turret Lathe an unequalled producer on all work within range.



### DUO CONTROL Turret Lathes Built in These Sizes

No. 1—Semi- and Full Universal,  $2\frac{1}{4}$ " capacity.

No. 2—Semi- and Full Universal,  $3\frac{1}{4}$ " capacity.

No. 3—Semi- and Full Universal,  $3\frac{1}{2}$ " spindle capacity.

17" and  $4\frac{1}{2}$ " Semi- and Full Universal,  $4\frac{1}{2}$ " spindle capacity.

THE ACME MACHINE TOOL CO., Cincinnati, Ohio

## 3 Siewek Tools SERVING INDUSTRY WELL

To serve industry well, a tool must save time...energy...or money. Siewek Tools make these savings. Take for instance:



### Siewek Drill Jigs

The cushion clamping of these jigs saves energy, loading time, allows closer accuracy, and increases production. They are built in nine sizes.

### Siewek Fixture Locks

These locks save production costs by re-

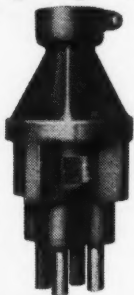


ducing spoiled work. The quick, positive action insures a strong grip that holds work immovable, eliminating danger of

shifting under cut. There are nine sizes.

### Siewek Drill Heads

When used with Siewek Drill Jigs, these heads insure a set-up that will save time and increase production. There is a Siewek Drill head for every need.



WRITE FOR A CATALOG

## Siewek Tool Co.

10232 Woodward Ave., Detroit, Mich.

## This Keyseater

reduces  
costly  
set-up  
time!



Throughout industry production men are

reducing idle machine losses by reducing the set-up time between jobs.

And, for keyseating jobs you can't beat the DAVIS Keyseater. Its Two-Minute-Set-Up makes it a real money saver in shops where production costs count.

Two minutes is all the time required to change from one set-up to another. Two minutes and the machine is ready for any job from  $\frac{1}{8}$ " to 1" wide and up to 12" high.

Investigate the DAVIS Two-Minute-Set-Up . . . it means many extra savings for you. Send the coupon today.

## Davis Keyseater Co.

250 MILL ST. ROCHESTER, N. Y.


Send me full details on the Davis "Two-Minute-Set-Up" Keyseater.

Name..... Title.....

Firm .....

Address .....

City..... State.....



*This is Model  
ULO GUSHER,  
designed to meet  
the needs of the  
smaller shop.*

## Where Every Dollar Counts!

**I**N the small shop, where the cost of production and the overhead leave a very small margin of profit, every dollar counts! And every dollar saved on production is another dollar on the right side of the ledger.

That is why GUSHERS are always in evidence in the smaller shop. They are more economical and more efficient. They do a better job at a lower cost. Modernize your shop and get into the big money, with a

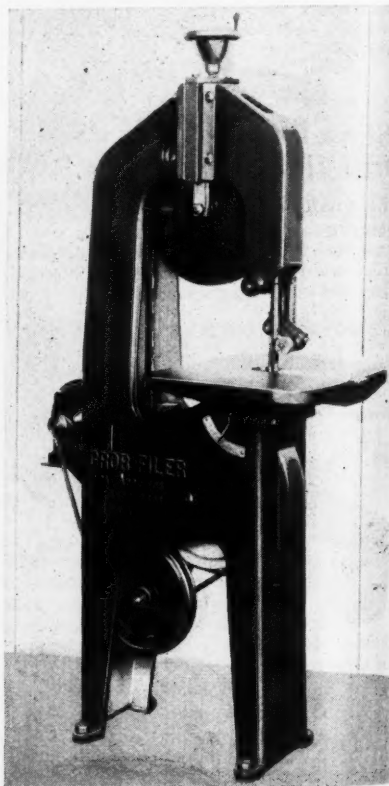
**GUSHER COOLANT  
PUMP**

**THE RUTHMAN  
MACHINERY CO.**

532 E. Front Street  
CINCINNATI, O.



Another outstanding feature of the machine is the method of driving the filing chain, which is accomplished by means of a Texrope reduction drive. The motor pulley, through a belt, drives a countershaft which, in turn and by means of a second belt, drives the lower sheave of the chain drive. The countershaft is so mounted that when pressure is applied to the filing chain, a torque



Grob No. 1 Filing Machine.

is developed which causes the driving belt to tighten. With this arrangement any additional pressure applied to the face of the file increases the tension of the driving belt and thus forms a more positive drive.

Three speeds are provided for by using a three-step drive pulley on the motor. The lowest speed is 170 ft. per min.; the intermediate speed is 195 ft. per min. and the highest, 220 ft. per min. The

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HAMIL



### Anderson Improved Balancing Ways

#### No Leveling Required

A simple and excellent device for balancing, straightening and trueing.



Four chilled iron discs rotate on ball bearings

They are made in the following sizes:

Swing	Greatest Distance Between Standards	Capacity in Lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

Write For Full Information

Mfd. By **Anderson Bros. Mfg. Co.**  
1926 Kishwaukee Street, Rockford, Ill.

### The RHODES "Convertible" "Two Machines In One"

The RHODES "Convertible" Horizontal Shaper and Vertical Slotter—two machines in one—is adaptable to a great variety of uses. It provides an ideal means of handling a large number of small jobs ordinarily assigned to much larger machines, and does the work accurately, speedily and economically.

An illustrated bulletin tells why the Rhodes Convertible is the handiest machine in the shop—send for it!



**THE RHODES MFG. CO.**  
WALTHAM, MASS.

## A MODERN SHAPER *for the* MODERN SHOP!

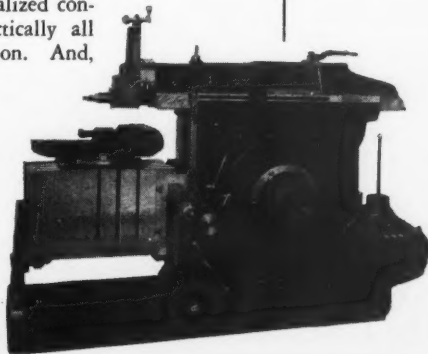
The Modern Shop demands higher speeds and heavier cuts without sacrificing accuracy.

That is the kind of service you get from the COLUMBIA "Superior" SHAPER. Its many features are designed to eliminate waste time. Its centralized control enables the operator to control practically all movements of the machine from one position. And, its heavier construction gives sufficient bulk to withstand the working stress of heavier cuts and higher speeds.

Send for bulletin 17. It tells the whole story of this Modern Shaper for the Modern Shop!

**THE COLUMBIA  
MACHINE TOOL CO.**

HAMILTON --:-- OHIO

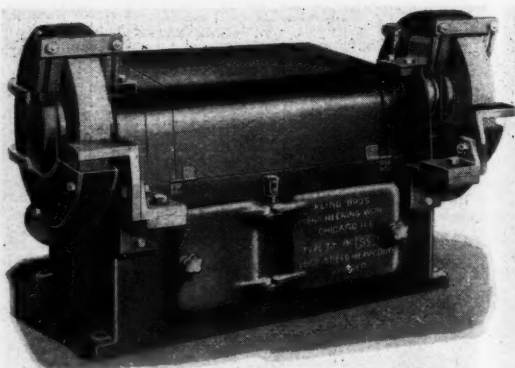


back slide, against which the links of the filing chain operate, is made of hardened steel and is replaceable. An adjustable slide, mounted on the table, provides for taking up any gap that may exist between the filing table and the filing chain. This adjustment is required, however, only when the table is tilted. The guide that supports the filing chain directly above the table can be adjusted to suit the height of the work. Rigidity is assured when filing either thin or thick pieces.

The machine is 61 in. high over all, and the floor space required is 12 x 19 in. Weight, uncrated, 400 lbs.; crated, 450 lbs.

### Kling "Series T" High Speed Heavy Duty Grinders

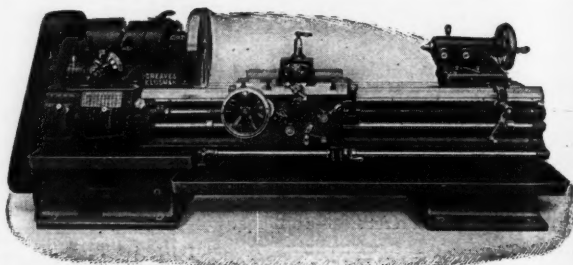
A new line of high speed, heavy duty grinders has been placed on the market by Kling Brothers Engineering Works, 1303 N. Kostner Ave., Chicago, Ill. This



Kling "Series T" High Speed Heavy Duty Grinder

line, known as the "Series T," is made in three sizes; type "RT" for 18 x 2-in. wheels, type "ST" for 24 x 3-in. wheels, and type "TT" for 30 x 4-in. wheels. All three units are of the same general construction.

The design of the series T grinders incorporates three features said to be entirely new in grinder design. The wheel shaft is split, and is connected



*Investigate*

## G. K. Single Lever Control

**FIND** out how it simplifies lathe operations . . . how it increases production . . . and how it saves time.

G. K. Single Lever Control enables your operator to INSTANTLY select any speed of an extremely wide range through one lever. It eliminates the necessity of searching through several combinations of levers for the right speed.

Send for a G. K. Catalog . . . it describes many more features of vital interest to the production man!

G. K. Single Lever Control lathes are built in six sizes . . . belt or motor drive.

**The GREAVES-KLUSMAN TOOL CO., Cincinnati, Ohio**

*Quick Adjustment**Accurate  
Alignment**Improved  
Results**with the***MIDWEST  
ADJUSTABLE  
HOLDER!**

The results you get with the use of MIDWEST ADJUSTABLE HOLDERS are three fold. They are:

**1. QUICK ADJUSTMENTS**

The holder can be adjusted instantly by hand. There are no screws or locknuts in the MIDWEST HOLDER. Adjustments in length can be maintained to a limit of .003".

**2. ACCURATE ALIGNMENT**

The MIDWEST HOLDER is built to Precision Limits which assures accurate alignment.

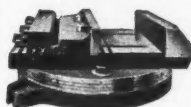
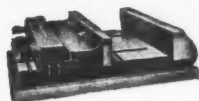
**3. IMPROVED RESULTS**

Designed for quick adjustments—and you get more adjustments in proportion to size than with any other holder—and built accurately means that you can improve your product by working to closer limits.

Let us show you how . . . send for a catalog!

**Midwest Tool & Mfg. Co.**

2362 W. Jefferson Avenue  
DETROIT MICHIGAN

**SKINNER  
PLANNER  
CHUCKS****Round  
Base****Square  
Base****ROUND BASE**

Size Chk. No.	List Price	Lgth. of Jaw In.	Dpth. of Jaw In.	Jaws Will Open In.	Space Re- quired In.	Total Space Re- quired When Used at Any Angle In.	Appx. Ship. Wgt. Lbs.
6 R	\$48.00	7	1 1/4	3 1/2	10	11 1/4	77
8 R	61.00	9	1 3/4	5	11 1/2	14	95
10 R	76.00	11	2 3/4	6	14	17	165
12 R	93.00	13	2 3/4	8	16	20	220
15 R	120.00	15 1/2	2 1/2	9 1/2	20	24	310
18 R	155.00	18 1/2	2 3/4	11 1/4	22	27 1/4	442
24 R	220.00	24 1/2	2 3/4	16	26	33 1/2	722
30 R	320.00	30 1/4	3	21 1/2	33	42	1200

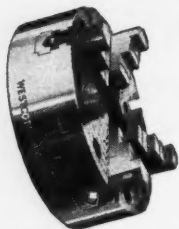
**SQUARE BASE**

Size Chuck No.	List Price	Lgth. of Jaw In.	Dpth. of Jaw In.	Jaws Will Open In.	Space Required Inches	Apprx. Ship. Wgt. Lbs.
6 S	\$37.00	7	1 1/4	3 1/2	7 1/4 x 11	55
8 S	43.00	9	1 3/4	5	9 x 12 1/2	68
10 S	51.00	11	2 3/4	6	11 x 15	110
12 S	64.00	13	2 3/4	8	13 x 17	157
15 S	87.00	15 1/2	2 1/2	9 1/2	15 1/2 x 21	234
18 S	110.00	18 1/2	2 3/4	11 1/4	18 1/2 x 24	325
24 S	160.00	24 1/4	2 3/4	16	24 1/4 x 28	508
30 S	270.00	30 1/4	3	21 1/2	30 1/2 x 34	1056

**THE SKINNER CHUCK COMPANY**

NEW BRITAIN, CONN U.S.A.

# Westcott Chucks



I.X.L. Independent  
Lathe Chuck

for  
Lathes  
and  
Drills

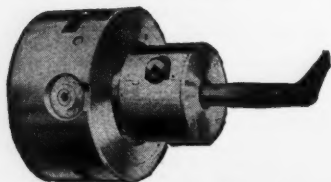
Combinations - Independents

Universals

Two-Jaw Round Body  
Lathe Chucks

"Little Giant" Drill Chucks

SEND FOR CATALOG  
ON COMPLETE LINE



## CASLER Offset Boring Heads

Reduce the cost of  
Jigs - Fixtures  
Experimental Work  
Manufacturing

SEND FOR CATALOG

## Westcott Chuck Co.

124 E. Walnut St., Cneida, N. Y.

Manufacturers of Lathe and Drill Chucks  
Sole Distributor Casler Offset Boring Heads

by a rigid, bolted coupling which can be removed for quick replacement of V-belts. This feature eliminates the necessity for tearing down the machine to replace a belt, and thus saves a considerable amount of time and expense. Another important time and labor-saving device is the quick change speed sheave arrangement. The change can be made by removing but one nut.

Still another important feature is a unique safety device which prevents operating wheels at other than recommended speeds. The device consists of control arms located under the motor base, connected with the spark guards by a cam-and-lever mechanism. When the guards are lowered, due to wheel wear, the control arms are also lowered, permitting the motor base to slide forward and thereby making possible the mounting of the next size sheave. Spark guards cannot be raised for the mounting of new wheels until the motor has been moved back to the slow speed position, thus eliminating the danger of running wheels at excessive speeds.

The series T grinders are designed and built to meet any requirements for rough grinding and snagging on steel or iron.

## H-P-M Hydraulic Straightening Presses

The Hydraulic Press Manufacturing Company, Mount Gilead, Ohio, announces a complete new line of hydraulic presses for production service in straightening shafts, axles, bars, rods, and other similar parts. The presses are designed especially to meet the necessities of high production capacity and precision control. As they are intended for use with heavy work which could not conveniently be moved back and forth under the ram, the pressure unit is arranged so that it can be moved along the bed of the machine.

The high production feature is made possible by the new patented H-P-M "Fastverse" oil pressure system employed for operating the press, by which the press ram is moved to and from the work rapidly. Both the direction and speed of ram travel is easily governed by the H-P-M manual control, which is operated through a single conveniently-located hand lever. The ram moves in the direction indicated by the lever, the speed of the ram being proportional to the distance the lever is moved from neutral. As the ram can be moved fast, slow, or stopped by mov-

# Spiral Gears

*are easy on a*

# BOLENDER

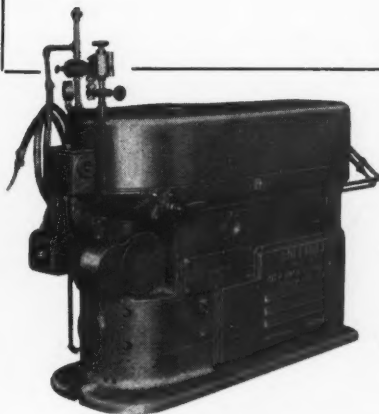
WITH the modern trend toward quietness in the transmission of power spiral gears are coming into more common use.

The Bolender is easily arranged for burnishing spiral gears and turns them out accurately at speeds worth investigating.

The simplicity of this compact machine both in construction and operation and its wide range of application is amazing. It will cost you nothing to get fully acquainted with all the possibilities of this husky gear burnisher. Write for literature or ask for a representative to call and tell you all about the Bolender.

**City Machine & Tool Works**

E. Third at June, Dayton, O., U.S.A.



Other C M & T products include the Bolender Gear Grinding Chuck and Peerless Gear Chamfering Machine.

## EFFICIENCY—DEPENDABILITY

*Both Prime Factors Built in*

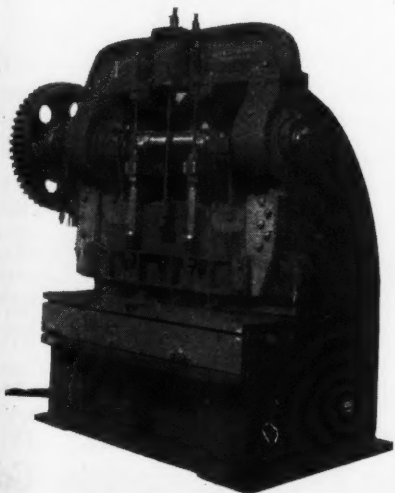
### POWER PUNCHING and SHEARING

*Machinery Made By*

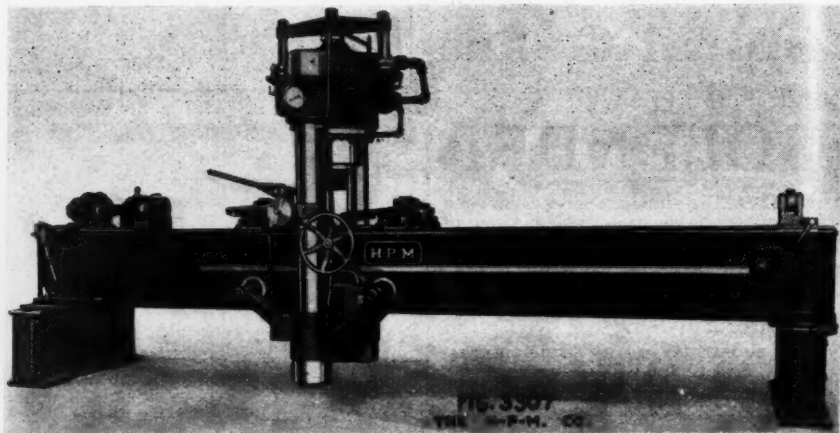
**THE LONG & ALLSTATTER CO.**  
HAMILTON, OHIO

A superior and more complete line than ever, for perforating and cutting off metal in practically any size or shape

**STEEL PRESS BRAKES  
ALLIGATOR SHEARS  
POWER PRESSES**



Gate Shear, Medium Size



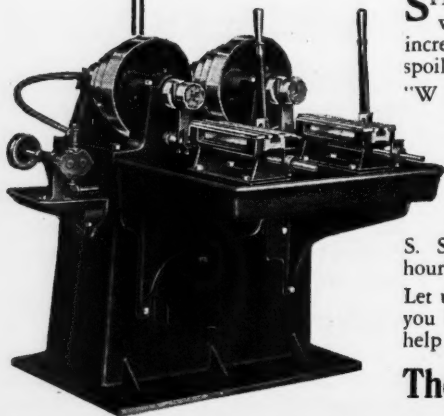
H-P-M 400-Ton Hydraulic Straightening Press

ing this one lever, any degree of accuracy required can be obtained. The lever can easily be moved with one finger, yet a pressure can be applied of— in the case of the largest press—400 tons.

The line includes six standard sizes

of straightening presses, with pressure capacities of 75, 100, 150, 200, 300, and 400 tons, respectively. The maximum working pressure is automatically regulated and can be adjusted over a wide range up to the maximum rating of the press.

## SPEED and ACCURACY COMBINED



**S**PEED AND ACCURACY are two factors which reduce threading costs. Speed . . . to increase production; Accuracy . . . to reduce spoilage.

"W & P" Threading Machines . . . built by Mitchell Engineering . . . combine these two factors. The result is a high production thread cutting and tapping machine which will save money in any shop. On the machine illustrated an operator can easily thread over eight hundred  $\frac{1}{2}$ " U.

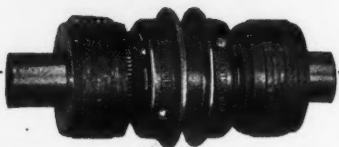
S. S. threads, standard screw length, in an hour's time.

Let us know your threading job . . . we'll show you how a "W & P" Threading Machine will help you.

**The Mitchell Engineering Co.**  
SPRINGFIELD, OHIO



## Helping Industry...



**PULLING** the heavy loads—year in and year out—more efficiently and with less adjustments is the kind of service you get from the **PULLMORE Industrial Clutch**. This service helps industry to lower production costs and increase production.

The perfect balance of the **PULLMORE Clutch** allows it to operate at high speeds. Its good design and excellent workmanship makes the **PULLMORE** a high grade piece of machinery—more than just a clutch.

That's why so many well known manufacturers of high grade machine tools, laundry machinery, cranes, rubber working machinery and many others use the **PULLMORE Clutch** as a standard part of their product.

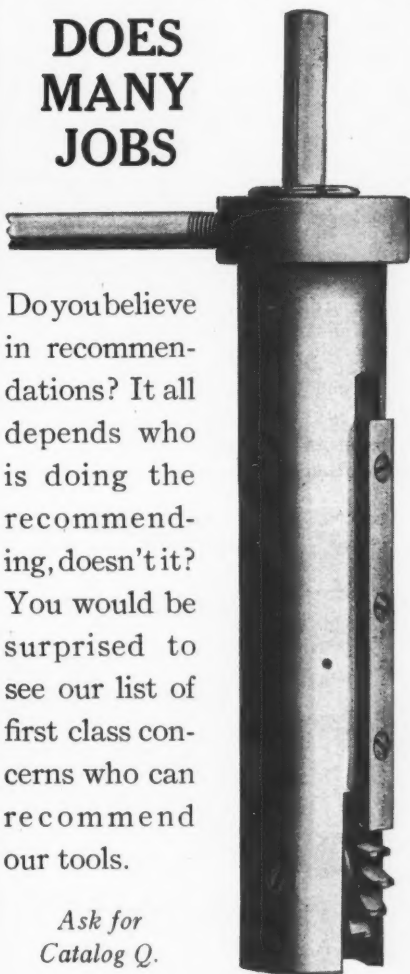
You, too, can solve your transmission problems with the **PULLMORE Clutch**. Let us show you how... just send the details of your requirements.

## Rockford Drilling Machine Company

10 Catherine St., Rockford, Ill.

## Worth While KEYSEATER

### DOES MANY JOBS



Do you believe in recommendations? It all depends who is doing the recommending, doesn't it? You would be surprised to see our list of first class concerns who can recommend our tools.

*Ask for  
Catalog Q.*

**National Machine Tool Co.**

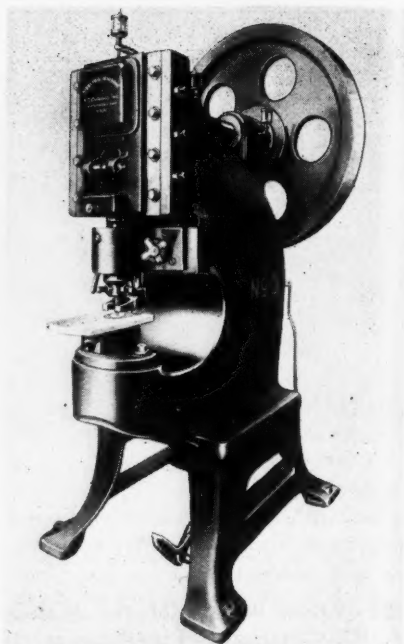
2271 Spring Grove Avenue

**CINCINNATI, OHIO, U. S. A.**

## Campbell No. 3 Nibbling Machine

The new Campbell No. 3 Nibbling Machine, which has been placed on the market by Andrew C. Campbell, Inc., Waterbury, Conn., is intended to fill the need for a machine to cut all kinds of shapes from sheet metal  $\frac{1}{8}$  in. to  $\frac{3}{4}$  in. thick. The machine is recommended not only for cutting original pieces, but also for production work where the cost of punches and dies is not warranted.

The machine will cut approximately 20 linear inches per minute, and leaves a clean edge which requires very little burring or finishing. Like the smaller Campbell nibbling machines, this machine works on the circular punch and die principle with a pilot to prevent the work from slipping and the punch from taking too large bites. The machine is built to handle a large variety of work. Circles can be accurately and easily cut by using the circle-cutting attachment. For making original cuts, the use of a straight edge and the French curve is recommended, as this insures close cutting to the line by even an inexperienced operator. The original piece may be used as a templet for cutting dupli-



Campbell No. 3 Nibbling Machine

cate pieces, as the punch follows the templet accurately.

Three lengths of stroke are provided for: 1 in.,  $\frac{1}{2}$  in., and  $\frac{1}{4}$  in., making it easy to handle all thicknesses of sheets from  $\frac{1}{8}$  in. to  $\frac{3}{4}$  in. The  $\frac{1}{4}$ -in. punch can be quickly set in the die by turning the stroke adjustment collar. The stripper plate is set in correct position by releasing the locking lever and turning the handwheel. The machine is rigidly proportioned and is designed with a large factor of safety.

The height of the machine over the wheel is 8 ft. 6 in. Depth of throat, 15 in. Floor space required without motor, 5 ft. x 4 ft. 2 in. Horsepower required,  $7\frac{1}{2}$ . Net weight, belt drive, 9,000 pounds.

## Mummert-Dixon Compound Spot Facing Tool

The Mummert-Dixon Company, Hanover, Penna., has brought out a compound spot facing tool in which retracting roughing cutters and fixed finishing cutters are incorporated in the same

## "C" CLAMPS



## Electric Steel FOR Long Service

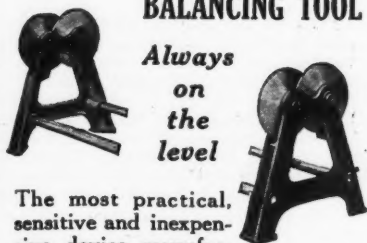
Made in seven sizes, opening from 3 to 12 inches.

Depth of throat  $2\frac{1}{2}$  in. on all sizes.

Write for catalogue No. 80, showing  
Clamps, Lathe Dogs and  
Expanding Mandrels.

**W. G. LECOUNT TOOL WORKS**  
SOUTH NORWALK, CONN.

## TWENTIETH CENTURY BALANCING TOOL



*Always  
on  
the  
level*

The most practical, sensitive and inexpensive device manufactured for balancing pulleys, cones, armatures, fly wheels, polishing wheels, etc. Will set anywhere and is easily portable. In sizes up to 24,000 pounds capacity.

*Ask for the Bulletin*

**Sundstrand Machine Tool Co.**  
ROCKFORD, ILL.

$\frac{1}{8}$  H. P.  
Type M5-A

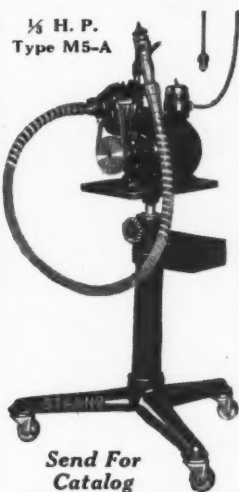
**Strand**

**Full Ball  
Bearing  
Machine**

$\frac{1}{8}$  H. P.

*Absolutely  
the finest  
machine  
built*

—  
We build sixty  
types and  
sizes of  
flexible shaft  
machines  
—

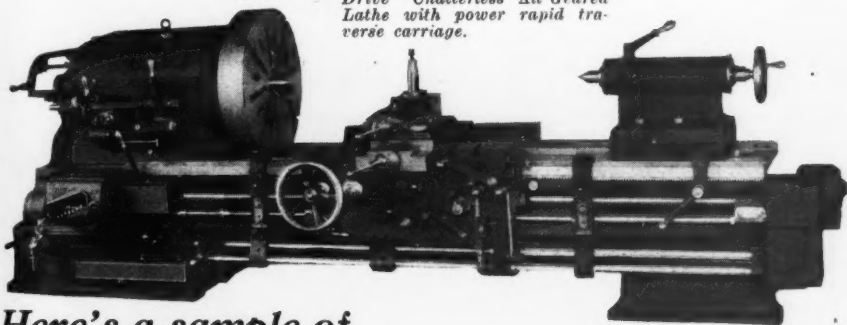


*Send For  
Catalog*

**N. A. STRAND & CO.**

5001 NORTH LINCOLN STREET  
CHICAGO, ILLINOIS

*BRADFORD 30-inch "Lo-  
Drive" Chatterless All Geared  
Lathe with power rapid tra-  
verse carriage.*



*Here's a sample of...*

## BRADFORD PERFORMANCE!

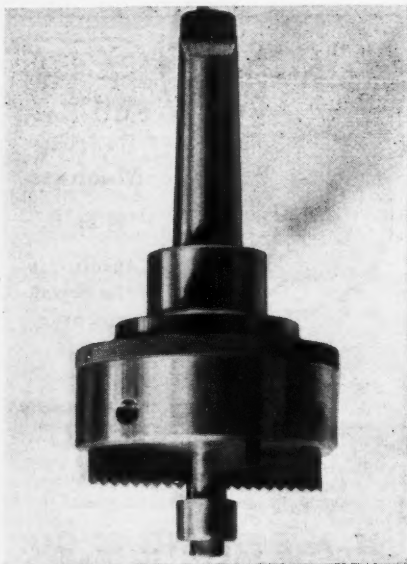
THE following test, made on the BRADFORD lathe shown above, illustrates the kind of service you get from these tools.

A bar of 60 carbon steel, 8" diameter, was placed in this lathe and run at a speed of 75 surface feet per minute. The feed used

was  $\frac{1}{32}$ " and the depth of cut  $\frac{1}{8}$ ". The result obtained was a smooth finish absolutely free of all chatter marks.

BRADFORD Lathes give chatterless performance on all cuts—even heavy intermittent cuts. Get the whole story—send for a catalog!

**BRADFORD MACHINE TOOL CO.** 659 EVANS STREET  
CINCINNATI, OHIO



**Mummert-Dixon Compound Spot Facing Tool**

tool. The tool is designed for quickly and accurately facing bosses up to six inches diameter. In addition to the finishing cutters, the tool carries a set of roughing cutters with serrated or "saw tooth" cutting edges which quickly and easily break up the hard, rough scale on cast iron or steel. These roughing cutters are moveable and may be fed down so that they project below the finishing cutters or as quickly withdrawn.

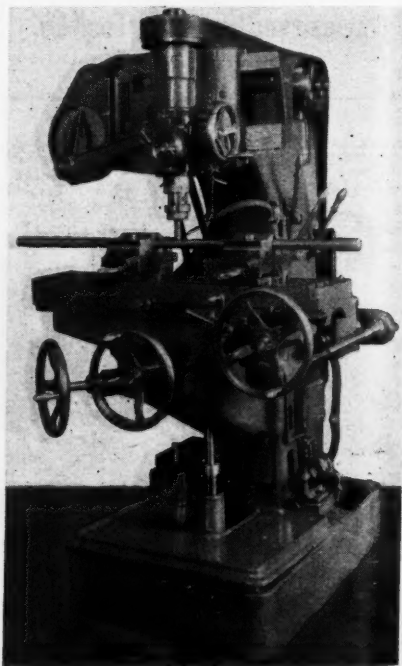
The movement of the roughing cutters is controlled by a knurled adjusting ring which is revolved by hand. When ready to face a rough casting, the roughing cutters are set to project below the finishing cutters and the boss is roughed down to within a short distance of the finish dimension. Then the roughers are moved up out of the way and the finishing cutters are used to give the boss a smooth, accurate finish.

The tool carries a pilot on which trimbles may be placed to fit any size of hole in work to be faced. An auxiliary pilot post may also be used when the hole in the work is rough-cored or is too large for the regular pilot. A jig can be furnished for grinding the cutters, if desired, one jig serving for both types of cutters. The tool is furnished in four sizes—2½ in., 4 in., 5 in., and 6 in.

## Hurth Automatic Vertical Slot, Keyway, and Spline Milling Machine

The Index Machinery Corporation, 49 Central Avenue, Cincinnati, Ohio, is now marketing the Hurth Automatic Vertical Slot, Keyway, and Spline Milling Machine shown in the illustration. The outstanding features of the machine are the patent reciprocating crank drive with special compensating device by which uniform feed is obtained for the reciprocating motion of the cutter slide, accurate depth-setting device with automatic release, wide range of spindle speeds, and wide range of application of the machine.

The machine is of the vertical type, belt-driven either through fast and loose pulleys from the lineshaft, or from a motor located on a base at the left side of the machine. The table is of the flush-top type, and is of liberal propor-



**Hurth Automatic Vertical Slot, Keyway, and Spline Milling Machine.**

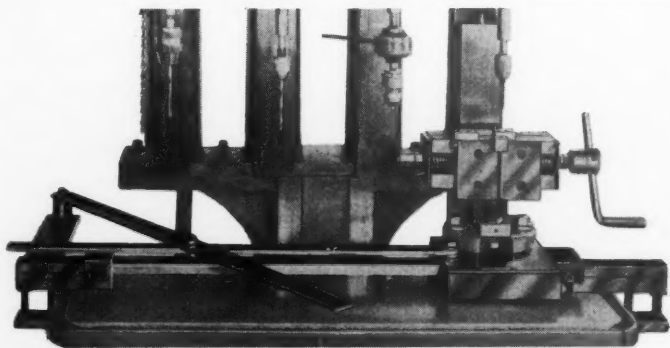
tions. Three T-slots are provided for clamping work, and two channels carry the coolant back to the sump. The saddle is long, with large bearing surfaces for the table, and the knee is provided with a long bearing surface on the column. Six automatic longitudinal feeds are provided for the table.

The cutter slide, which carries the spindle, is provided with a rapid reciprocating feed actuated by a compensating crank drive. The extent of the reciprocating motion can be varied according to the length of the slot required by adjusting the crank disc, to which a scale is fitted that enables an accurate setting to be made. This form of drive insures that the reversal of the cutter slide will always occur at the same place, and without jerking, as the speed of the slide gradually decreases toward the end of the stroke and increases after reversal. Nine feeds in geometrical progression are provided, obtainable through a three-step cone pulley and a three-speed gearbox.

The spindle is of large dimensions and is well-seated in the spindle sleeve. Two ball bearings are provided for the spindle together with a thrust bearing which takes the axial thrust and prevents torsional strain on the spindle. The spin-

dle is driven by a belt which runs over two guide pulleys mounted on a moveable support, making it possible for the pulleys to automatically follow the reciprocating motion of the spindle. To compensate for the unequal distances between the spindle and guide pulley support, which exist when the spindle is at the end position, a tension pulley is provided which adjusts itself to take up the slack in the belt. The spindle drive, reciprocating movement of the cutter slide, and longitudinal feed of the table are all connected by a positive drive so that if the spindle belt should slip off, all automatic movement would immediately stop. Five spindle speeds are provided, varying from 250 to 1,000 r.p.m.

Six automatic down feeds are provided to the spindle, the feed changes being obtained by two feed setting wheels. The vertical movement is actuated by a worm, meshing with a rack cut in the spindle sleeve. Provision is made for take-up in case of wear. The automatic down feed can be decreased or increased while the machine is running. A dial scale enables the depth of feed to be set to an accuracy of .004 inch. All feeds can be set to release automatically, precluding the possibility of damage and



## Split Second Jig Alignment....

... on a multiple spindle drill press becomes a simple matter with a "JOHN'S" Universal Drill Jig and Hand Lever Controlled Carriage.

The illustration shows these two devices set up on a four-spindle machine. A

simple movement of the hand lever is all that is necessary to move the jig quickly from spindle to spindle. Perfect alignment is assured at all times.

Let us show you how to speed up your production with these devices . . . send for a bulletin.

**Heuser Manufacturing Co.** 1638 N. PAULINA AVENUE  
CHICAGO, ILLINOIS

allowing the operator to attend to other work. An important feature of the machine consists in that, by disengaging the automatic cutter slide, it can be used as a vertical milling machine, in which capacity it is well adapted for jig, tool, or other work of a similar nature.

Slots up to  $1\frac{1}{2}$  in. wide and  $3\frac{1}{2}$  in. deep may be cut with this machine. A slot up to  $7\frac{1}{2}$  in. length may be cut by the use of the cutter slide, operated by the crank drive, or 20 in. in length by using the automatic table feed, or 27 in. in length by using a combination of the two feeds. The distance from spindle to center of column is 15 inches, and the distance from the spindle-nose to the surface of the table is 20 inches. The working surface of the table is 40 x 105 in. Longitudinal movement of table (power and hand), 20 in. Cross movement of table, 10 in. Vertical movement of table, 17 in. Power required (motor 1,400 r.p.m.) 2 h.p. Floor space required, 5 x 5 ft. Height of machine, 6 ft. Net weight, 3,800 pounds.

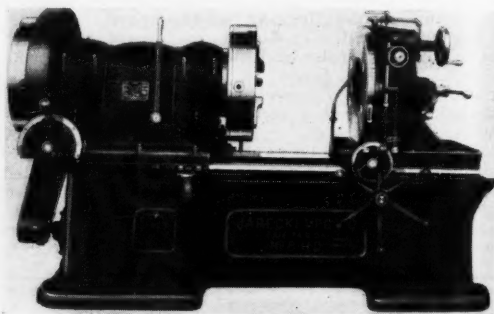
### Jarecki No. 8-HD High Speed Pipe Threader

A number of improvements that are said to increase production and reduce threading costs are incorporated in the design of the No. 8-HD High Speed Pipe Threader, which has been placed on the market by the Jarecki Manufacturing Co., 1303 W. 12th St., Erie, Pa. The machine is built for a standard capacity of  $2\frac{1}{2}$  to 8 inches, with an extra capacity of  $1\frac{1}{2}$  to 2 inches. The automatic self-opening die head with which the machine is equipped covers the entire range. Two sets of chasers — six to the set — are regularly furnished, both sets threading the entire standard range of  $2\frac{1}{2}$  to 8 in., 8 thread.

The new type chasers used in the No. 8-HD machine are  $2\frac{1}{4}$  inches wide, providing ample width for cutting an 8-in. standard thread, which is 2.21 in. long. In addition to the usual features of single die head operation, the machine is equipped with a forged steel trigger extending inside of the die head which automatically opens the dies when the correct length of thread has been cut. When the chasers are open the trigger recedes out of the way, returning again to position when the chasers are closed. Chasers may, however, be drawn back by hand when desired.

The chasers are automatically and quickly set for the size of pipe to be threaded by the turning of a hand wheel which revolves a cam plate. The cam plate is marked for each pipe size within the range of capacity of the machine, and one operation only is necessary to align the chasers for the size desired.

Timken tapered roller bearings are used throughout, reducing friction to the minimum. All gears are of cut steel, running silently in an oil bath. Parts subject to wear are of hardened chrome nickel steel. Besides a powerful 3-jaw universal chuck at the front end of the spindle, the rear universal chuck is designed with projections on the jaws for gripping flanges and fittings.



Jarecki No. 8-HD High Speed Pipe Threader

A range of six spindle speeds gives an average threading speed of over 29 ft. per min., and 8-in. pipe may be cut off at a speed of more than 100 ft. per min. The speed-change dial has pipe sizes marked plainly on the plate, and the operator can instantly select the speed desired. A long lever, within easy reach of the operator, provides for quick changing from any threading speed to high speed for cutting off and reaming. The use of a multiple disc clutch eliminates clash or jar and makes gear-changing smooth and easy. The disc clutch also provides against overloads and thus protects the gears, chasers, and pipe. The spindle of the machine is bored to  $10\frac{1}{4}$  in., which permits passage of an 8-in. pipe with coupling attached.

Cutting-off and chamfering are done at the same time. The machine is supplied for either belt or motor drive. For motor drive, a 5 h.p. constant speed motor, located in the base of the machine, transmits power through a self-oiling silent chain. All gears and moving parts are enclosed. Floor space required, 4 ft. 2 in. x 8 ft. 3 in.



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**Grooved  
(Cast Iron)  
Pulleys**



### All Size Holes

Pulley Diam. inches	Size of Holes inches
2 1/2	3/8 1/2 3/4
3	1/2 3/4 1
4	3/4 1 1 1/4
5	1 1 1/4 1 3/4
6	1 1/4 1 3/4 2
8	1 3/4 2 2 1/4
10	2 2 1/4 2 3/4
12	2 3/4 3 3 1/4

Special Holes Bored

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With and Without Jig Attachments

3 sizes, 6", 9" and 12" jaws

Often used on Miller, Shaper or Planer.

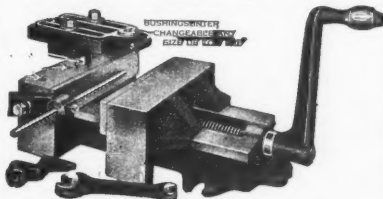
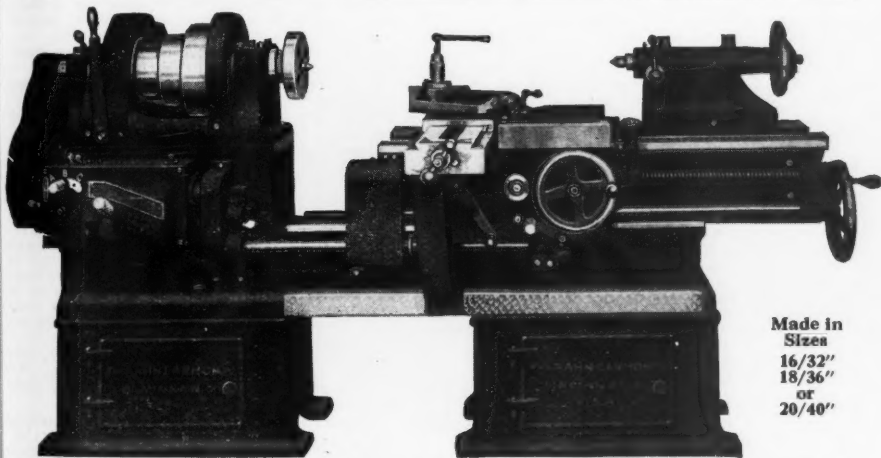


Fig. 1. With Jig Attachments.

The attachments mean you can do much duplicate drilling without the cost of a jig. Any vise will pay. More time is consumed in catching work than drilling it.

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18/36"  
or  
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A lathe for large or small swing work, ready at all times. Requires no extra rigging up. Takes different distances between centers.

Belt driven or with nine speed all geared motor driven head. Tell us what your requirements are and let us quote you.

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## For Your Catalog Library

Check any of these useful publications that you want, write your name, firm name, title, and address on the margin, then tear out the page and send to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. They will be forwarded to you promptly without cost or obligation. Please restrict your list to not more than ten.

**Abrasive Grinding Wheels:** The types of wheels, with recommended grades and grains, which should be used for each of the various kinds of grinds are discussed in a booklet which will be sent free to mechanical executives by the Abrasive Company, Philadelphia, Pa.

**Broaching By Modern Methods:** Equipment and tools for finishing round, square or irregular-shaped holes and surfaces by broaching are described and illustrated in a booklet that is issued free by the American Broach & Machine Co., Ann Arbor, Michigan.

**Ames Dial Gages:** The latest types of dial gages for inspection purposes are described in the Ames No. 55 Bulletin, which will be sent free to any machine shop executive. Address B. C. Ames Co., Waltham, Mass.

**Scraping By Power:** Bearing surfaces can now be scraped with a power scraper that is quicker and easier than the old-fashioned hand method. The tool is described in a folder that is issued by Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill. Sent free on request.

**Steel Furniture for the Shop:** The complete line of steel furniture made by the Angle Steel Stool Co., Plainwell, Michigan, including steel stools and chairs, steel foremen's desks, lockers, tables, tool stands, machine tenders, shop boxes and pans, iron bar racks, trucks, bench legs, and bench drawers, is described and illustrated in Catalog "C," which is issued free to machine shop executives.

**Machine Shop Accessories:** Catalog B-27, issued by the Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., describes the line of tool holders, boring tools, wrenches, pipe tools, ratchet drills, lathe dogs, and other tools manufactured by this company.

**Metal and Wood Saws:** Catalog No. 20 describing saws of all kinds, for both metal and wood. 256 pages of descriptions of saws and sawing machinery. E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.

**Hold Odd-Shaped Pieces Securely:** A vise in which odd-shaped work can be held securely without the need of special jaws or fixtures is described in a folder that has been issued by The Avey Drilling Machine Co., P. O. Box 487, Cincinnati, Ohio. Copy free upon request.

**Hobs and Milling Cutters:** A complete line of milling cutters and hobs for cutting all kinds of gears, splines, sprockets and other forms is described in Catalog G, issued by the Barber-Colman Company, Rockford, Ill. Descriptions and illustrations of the Barber-Colman hobbing machine and hob-sharpening machines are included. Sent free on request.

**All-Geared Drilling and Tapping Machines:** A catalog describing in detail the various types of all-geared, self-oiling, drilling and tapping machines made by the Barnes Drill Co., 801-851 Chestnut Street, Rockford, Ill., will be sent free upon request.

**Modern Drilling Equipment:** Circulars describing the various types and sizes of Barnes upright drills, multiple drills and horizontal drilling machines made by this company have been issued by the W. F. & John Barnes Co., Rockford, Ill.

**Automatic Oiled Die Sets:** The automatic oiled die sets, die shoes, punch holders, leader pins, bolster plates, bushings, and other standard die parts made by the E. A. Baumbach Manfg. Co., 1806 S. Kilbourn Ave., Chicago, Ill., are described in Catalog No. 5, which has been issued by that company. Sent free upon request.

**"C-V" Chrome Vanadium Wrenches:** A complete line of wrenches made of Chrome Vanadium steel—practically

unbreakable—is described in a booklet that has been issued by the Bonney Forge & Tool Works, Allentown, Pa. Copy free upon request.

**Bradford Precision Lathes:** Precision Lathes for the tool room and for general manufacturing purposes, all-geared and cone types, belt or motor driven, are described and illustrated in a catalog that is issued by The Bradford Machine Tool Co., 657-671 Evans St., Cincinnati, Ohio. The catalog also includes descriptions of taper, relieving, turret and other lathe attachments. Sent free upon request.

**How To Sharpen Staggered Tooth Cutters, Helical Milling Cutters, and Two-Lipped End Mills:** A series of pamphlets on these subjects can be obtained without charge by addressing the Brown & Sharpe Mfg. Co., Providence, R. I.

**High Speed Drill Presses:** A complete line of drill presses that can be run at high speeds with complete safety is described in catalog number 50, issued by the Canedy-Otto Manufacturing Company, Chicago Heights, Ill. This catalog also contains descriptions of other equipment manufactured by this concern. Sent free upon request.

**Gear Data:** The Cincinnati Gear Co., Cincinnati, Ohio, has published Catalog D, which describes and illustrates the various types and kinds of gears made by this firm. The book contains photographs of the plant departments, with descriptions of the equipment employed, and also includes a number of pages of valuable data and reference tables for machine shop use.

**Grinding the Centerless Way:** The advantages of the centerless grinding method is discussed in a booklet which also describes the centerless grinding machines made by Cincinnati Grinders, Inc., Cincinnati, Ohio. The illustrations show various types of jobs in process, and full data is included. Copy free upon request.

**Rapid Traverse Planers:** Cincinnati Hypro Planers, made by the Cincinnati Planer Co., Cincinnati, Ohio, are described in a new catalog that has been issued by this company.

**Bolender Gear Burnishers:** Gears will operate more smoothly and more silently if burnished. Full description of the Bolender Gear Burnisher can be had by addressing the City Machine & Tool Works, Third and June Sts., Dayton, Ohio.

**Handbook For Drillers:** The Cleveland Twist Drill Co., 1242 E. Forty-ninth St., Cleveland, Ohio, has published a book in which the various parts of the twist drill are described, and which tells how to grind a drill correctly. The troubles that result from incorrect grinding are described and illustrated and several chapters are devoted to the subjects of speeds, feeds, materials, cutting compounds, and so on. Sent free upon request.

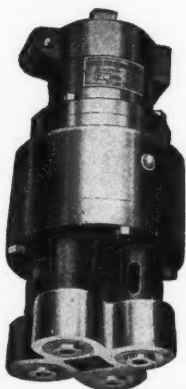
**Columbia Superior Shapers:** Bulletin No. 17, issued by The Columbia Machine Tool Co., Hamilton, Ohio, describes and illustrates the line of heavy duty shapers made by this firm. Copy free upon request.

**Columbia Tool Steel Handbook:** A book containing valuable information concerning the making of tool heat treating, uses of hardness testing instruments, uses of the quenching bath, drawing bath, and other heat treating equipment, and together with tables and other useful information can be obtained without charge by addressing the Columbia Tool Steel Co., 550 E. 14th St., Chicago Heights, Ill.

**Broaching for Profit:** A combination round and spline broach which broaches the drilled hole to size, cuts the splines, and removes the burrs in one operation is

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**WITH** this simple attachment on your one-hole-at-a-time drilling machine, you can drill two, six, a dozen, or fifty holes, if necessary, in the same time it takes to drill one.

The drill head shown above is a single purpose tool for drilling four holes at one time. It is a fixed spindle multiple head, but we also make adjustable spindle multiple heads, which can be used on a variety of jobs. What is your problem? We will design a U. S. Multiple Drill Head to meet your particular needs. Send us your blue print NOW.

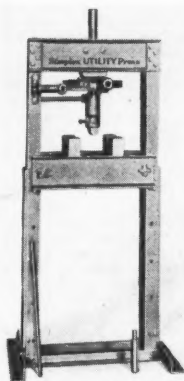
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**PRESSURES** up to 80,000 lbs. can be exerted in the new Simplex Utility Press designed for toolroom and machine shop use.

Useful in toolroom for shearing soft punches in hardened dies; also for trying out dies. Also useful for making stops or supports where piece to be punched is longer than width of die.



**SIMPLEX UTILITY  
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Will bend cold a piece of  $\frac{1}{2}$ " by 4" steel to a 90 deg. angle with piece having better appearance than if forged. Useful for pressing posts in dies, or for pressing in pieces wherever a press fit is required.

Will straighten a 3" shaft if necessary.

Equipment includes two combination blocks which are used as parallels, straightening V's and bending dies; one V nose; one plain nose, and one bar.

Made in two sizes. Specifications: overall height 66" and 70"; width between frame, 21" and 33"; travel of screw, 8"; and space between side members,  $\frac{3}{4}$  inches.

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Kindly send literature suggesting uses for your utility press, and quote prices.

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described in a circular which will be sent free by The Connecticut Broach & Machine Co., New London, Conn.

**Die Makers' Supplies:** A complete line of die sets, leader pins, bushings, and other die makers' supplies are described in a book that is issued by the Dandy Machine Specialties, Inc., 2104 South 52nd Avenue, Chicago, Ill. Sent free upon request.

**Davis Keyseaters:** Recent developments in keyseating methods are discussed in a bulletin that also describes the keyseaters made by the Davis Keyseater Company, 250 Mill St., Rochester, N. Y. Copy free upon request.

**Grinding Wheel Dressers:** All of the different types of grinding wheel dressers made by the Desmond-Stephan Mfg. Co., Urbana, Ohio, including Desmond-Huntington, Desmond-Sherman, Zig-Zag, Diamo-Carbo, and diamond dressers, are described and illustrated in a catalog that has been published by the firm mentioned. Free upon request.

**Precision Grinding:** A booklet which describes and illustrates the most modern methods of performing all kinds of precision grinding operations, showing how the Dumore grinder can be applied to various kinds of machine tools, has been published by The Dumore Company, Racine, Wis. Copy free upon request.

**Interchangeable High Production Tools:** Catalog No. 28, issued free by the Eclipse Counterbore Co., 7410 St. Aubin St., Detroit, Mich., describes and illustrates the interchangeable counterbores, spot facers, and form cutters, and other end cutting tools made by this firm.

**Grooved Cast Iron Pulleys:** All sizes of grooved cast iron pulleys, made by Efficient Machine Shop, 147 Baxter St., New York City, are listed in a circular that can be had by writing this firm.

**Precision Measuring Instruments:** The latest types and models of dial indicators, thread lead test gages, pitch gages, thickness gages, dial comparators, and other precision measuring instruments marketed by the Federal Products Corporation, Providence, R. I., are described and illustrated in a book that will be sent free upon application to this firm.

**"The Practical Art of Generating":** A simple and practical analysis of the generating principle, showing how teeth are generated on all kinds of gears, is included in a book that has been issued by The Fellows Gear Shaper Co., Springfield, Vt. Copy free upon request.

**Questions To Ask Before Buying a Jig-Boring Machine:** A list of the fine points to look for in a jig-boring machine, with descriptions and illustrations of the working parts of the Swiss Jig Borer, can be obtained free by addressing The R. Y. Ferner Co., 1511 K St., N. W., Washington, D. C.

**Gear Problems:** Catalog No. 203, published by the Foote Bros. Gear & Machine Company, Dept. 68, 111 N. Canal St., Chicago, Ill., is intended to serve as a complete reference work for all users of gears or speed reducers. Full instructions for figuring gears, sprockets, chains, etc., are included. Copy free to any mechanical executive.

**Formica Silent Composition Gears:** A booklet telling about the uses and advantages of Formica Silent Shock Absorbing Gears, and containing a considerable amount of valuable data with rules and tables for laying out, cutting and using gears. Sent free by Formica Insulation Co., 4632 Spring Grove Avenue, Cincinnati, Ohio.

**Fosdick Drills:** This publication gives details as to the design and construction of Fosdick Radial, Upright, and Sensitive Drills. Published by the Fosdick Machine Tool Co., Cincinnati, Ohio.

**Modern Grinding Equipment:** The complete line of universal tool and cutter grinders, surface grinders, drill grinders, tap grinders, and other grinding machines made by the Galmeyer & Livingston Co., 336 Straight St., S. W., Grand Rapids, Michigan, is described in a series of bulletins that have been issued by this firm. Free upon request.

**Flat Surface Grinding:** Automatic, semi-automatic, and single-purpose machines for performing all kinds of grinding operations on flat surfaces are described and illustrated in a book that has been issued by the Gardner Machine Company, Beloit, Wis. Copy free upon application.

**Adjustable Blade Cutters:** Hollow mills, facing tools, face mills, milling cutters and other production tools with adjustable, interchangeable blades are described and illustrated in a booklet that is issued free by the Genesee Manufacturing Co., 141 N. Water St., Rochester, N. Y.

**Machine Vises of all sizes for use with machine shop equipment are described in a circular that will be sent free upon application to The Graham Mfg. Co., 69 Willard Ave., Providence, R. I.**

**Greaves-Klusman Lathes:** A book containing complete descriptions of the latest types of lathes made by this firm has been issued by the Greaves-Klusman Tool Co., Oakley, Cincinnati, Ohio.

**Swiss Files:** The complete line of Grobet Swiss Files for use in die and tool work or for other fine work is described and illustrated in Catalog "K," published by the Grobet File Corporation of America, 3 Park Place, New York, N. Y. Copy free upon request.

**Drawing Tables:** The Hamilton steel-base, adjustable drawing table is described in Catalog No. 7-MS, issued by the Hamilton Mfg. Co., Two Rivers, Wis. Copy free upon request.

**Grinding, Polishing and Buffing Machines of the latest types are described and illustrated in a series of bulletins that have been issued by the Hammond Machinery Builders, Kalamazoo, Mich. Copies free upon request.**

**Flexible Shaft Equipment Eliminates Hand Labor:** Files, drills, grinding wheels, and other tools can be mechanically operated by the use of the flexible shaft equipment manufactured by the R. G. Haskins Co., 4653 W. Fulton St., Chicago, Ill. Catalog free upon request.

**Universal Drill Jig:** The John's Universal Drill Jig can be used for drilling, centering, milling, reaming, tapping, and other operations with slight changes. Descriptive circular can be had by addressing the Heuser Manufacturing Co., 1633 N. Paulina St., Chicago, Ill.

**Texdrive Grinders for Vitrified or High Speed Wheels:** A six-page bulletin No. 43 describes in detail and illustrates the advantages of the new Hisey Texdrive Grinder—stressing especially the multi-speed and single-speed machines. Write for a copy to The Hisey-Wolf Machine Co., Colerain and Marshall Sts., Cincinnati, O.

**Speed Reducers:** A catalog of speed reducers up to 200 h.p. and built to deliver any ratio desired in standard size units can be obtained by addressing The Horsburgh & Scott Co., 5110 Hamilton Ave., Cleveland, Ohio. Give firm name.

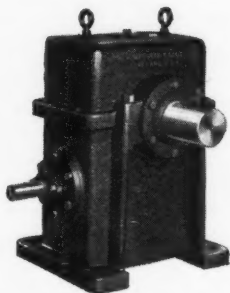
**"Houghton's Refrigerant Base" and "Nocut"—metal cutting oils manufactured by E. F. Houghton & Co., Philadelphia, Penna., are fully discussed, together with their outstanding properties, in two booklets which can be obtained without charge by addressing this firm.**

**Internal Grinding Equipment:** The latest equipment for grinding holes of all sizes, from small wrist pin holes to the holes in locomotive cylinders, is described and illustrated in a booklet that will be sent free by the Hutto Engineering Co., Inc., 542 Lyncaste Ave., Detroit, Michigan.

**"Do It Electrically":** The complete line of "Thor" universal electric tools, including tools for drilling, reaming, screw-driving, tapping, nut-setting, grinding, and for performing other operations is described in Catalog No. 17, issued free by the Independent Pneumatic Tool Co., 236 S. Jefferson St., Chicago, Ill.

**Tool Steel Composition, Selection, and Heat Treatment:** William Jessop & Sons, Inc., 121 Varick St., New York, N. Y., has published a series of pamphlets dealing with the above subjects. Copies free upon request.

## SPEED REDUCERS

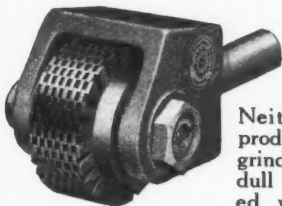


1/16 H.P. up to 200 H.P. Any ratio you desire in standard size units. Send for Catalog.

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Neither can produce good grinding with dull or glazed wheels.

Grinding wheels must be sharp! The Desmond Ball-Bearing Dresser is a practical substitute in many cases, for Diamond Dressers. It is designed for precision work.

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we do both.*

**Our Elevating, Conveying, Transmission  
and Chain Drive Experts Will  
Gladly Help You Solve Your  
Plant Problems.**

**The Wirthlin-Mann Company**  
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*Representing:* Diamond Chain & Mfg. Co.  
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**Special Mil-Waukee-Mills of Standard Units:** A milling machine of which the base, heads, columns, and other parts are built in standard units, thus enabling the user to order a machine that will be especially adapted for his job. Is described and illustrated in Catalog No. 36, issued by the Kearney & Trecker Corporation, Milwaukee, Wis. Free to machine shop executives.

**Koebel-Wagner Diamonds for Wheel Dressing:** The Koebel-Wagner method of mounting diamonds and the use of the "Dykon" gage are discussed in a bulletin issued by the Koebel-Wagner Corporation, 144 Orange St., Newark, N. J. Free upon request.

**Drill Around Corners:** Holes can be drilled in close quarters by the use of the Kozs Right Angle Drill. Can also be used for keywaying or countersinking. A descriptive pamphlet can be had by addressing Chas. A. Kozs, 464 Augustine St., Rochester, N. Y.

**Lathe Dogs and C Clamps** are described and illustrated in Catalog No. 80, issued by the W. G. LeCount Tool Works, South Norwalk, Conn. Copy free upon request.

**Air-Operated Work-Holding Devices:** A booklet showing how air-operated chucks and devices of various kinds can be applied to different kinds of machines to save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

**Punching and Shearing Machines** of the most modern design are described and illustrated in a series of bulletins that can be obtained without charge by addressing The Long & Allstatter Co., Hamilton, Ohio.

**Rapid-Reading Micrometer:** A new type of rapid-reading micrometer, designed to show the reading in numerals, is described in Catalog No. 5, issued by The Lufkin Rule Co., Saginaw, Michigan. The catalog also contains descriptions of the micrometers, calipers, gauges, scales, squares, bevel protractors, and other tools made by this company. Free upon request.

**"A Captain of Industry:"** Pocket Handbook 23-P, issued by The David Maydole Hammer Co., Norwich, N. Y., tells how David Maydole came to make what he considered the best hammer in the world, and also includes descriptions of the various types of Maydole hammers. Several useful tables are included. Copy free upon request.

**Time Saving Machine Equipment:** How machining time can be reduced to the minimum by the use of Wizard chucks, collets and tap holders, turret tool posts, self-centering steadyrests, and other McCrosky equipment is told in a book that is issued by the McCrosky Tool Corporation, Meadville, Penna. Will be sent without charge.

**Midwest Pin Drive Keyway Cutters** are described and illustrated in a catalog that can be had by addressing Midwest Tool & Mfg. Co., 2362 West Jefferson Ave., Detroit, Michigan.

**Polish at Any Speed:** The Mitchell motor-driven polishing lathe, in which herringbone gears are used to transmit power from the motor shaft to the lathe spindle, can be operated at any desired speed. Bulletin can be obtained by addressing the Mitchell Engineering Co., Springfield, Ohio.

**Natco Drilling, Tapping, and Boring Equipment** is the title of a publication that has been issued by The National Automatic Tool Co., Richmond, Ind. The book gives details as to construction and uses of "Natco" multiple drilling and tapping machines.

**Milling Internal Keyways:** A simple method of milling keyways in gears, wheel hubs, and other similar parts with the aid of a drill press and a special tool is explained in a booklet that is published by The National Machine Tool Co., 2271 Spring Grove Ave., Cincinnati, Ohio.

**"The Answer to Your Gear Problems":** Information as to correct methods of cutting and finishing gears will be supplied without charge by The National Tool Co., Cleveland, Ohio. This firm also carries a complete

stock of gear shaper cutters and markets the National-Cleveland Spur and Helical Gear Grinding Machine.

**Save Time with Expanding Mandrels:** How expanding mandrels will solve the problem of turning pieces with odd-size holes, and will increase production on duplicate work, is told in a folder that will be sent free upon request by W. H. Nicholson & Son, 136 Oregon St., Wilkes-Barre, Pa.

**Live Centers:** The complete line of live centers manufactured by Nielsen, Inc., of Lawton, Mich., are fully described in a bulletin issued by this company. This bulletin is illustrated with photographs and blueprints of the Nielsen Center. Mailed free upon request.

**Ball and Roller Bearing Data Sheets:** A complete set of data sheets showing all the dimensions and loads at given speeds, and giving instructions for mounting precision ball bearing and Hoffmann roller bearings, can be obtained without charge by addressing the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

**How To Grind Cemented Tungsten Carbide:** A booklet which describes and illustrates the correct methods of grinding tungsten carbide tools has been published by the Norton Company, Worcester, Mass. Copy free upon request.

**Die Making Machines:** How dies, templates, gages, etc., can be sawed out, filed, and lapped easily and accurately on Oliver die making machines is fully described in a bulletin issued by the Oliver Instrument Company, 1430 Maumee Street, Adrian, Mich. Mailed upon request.

**Self-Tapping Sheet Metal Screws:** Screws which are threaded and hardened in such a manner as to enable them to cut their own threads as they are screwed into sheet metal assemblies are described in a folder which is published by the Parker-Kalon Corporation, 192-196 Varick St., New York City, N. Y. Sent free upon request.

**Powell "Bio-Gun" Air Valves:** Air is faster and more efficient than a brush for cleaning machine tables. The use of the Powell Bio-Gun for this purpose is discussed in a catalog that can be obtained by addressing The Wm. Powell Co., Cincinnati, O.

**Tapping Devices, Quick-Change Chucks, Stud-Setting Tools and Bench Tappers:** A catalog describing the various types and kinds of tapping, drilling, and stud-setting devices manufactured by the Procnur Safety Chuck Company, 12 South Clinton Street, Chicago, Ill., can be obtained without charge by addressing this company. The catalog also tells the part that Procnur tools play in obtaining greater accuracy and less tap breakage.

**Engine, Turret, and Gap Lathes** are described in a series of bulletins that have been issued by The Rahm-Larmon Co., 2935 Spring Grove Ave., Cincinnati, Ohio.

**Shape or Slot With This Machine:** The Rhodes Convertible Shaper, made by The Rhodes Manfg. Co., Waltham, Mass., can be used for horizontal shaping or vertical slotting. Details upon request.

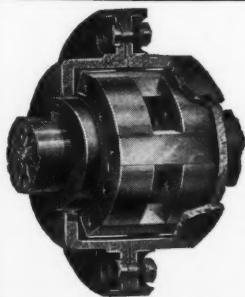
**Pullmore Industrial Clutch:** A multiple disc clutch, made in two types, to run in oil or dry, and which is so built that it can be operated at high speeds, is illustrated and described in a folder that will be sent free by the Rockford Drilling Machine Company, Rockford, Ill.

**Hy-Draulic Shaper-Planer:** The most modern features are embodied in the design of the Rockford Hy-Draulic Shaper-Planer, which is intended for work that would otherwise go to the small planer or large shaper. Write for folder to Rockford Machine Tool Co., 2414 Kishwaukee Ave., Rockford, Ill.

**Automatic Lubrication:** Individually motor-driven pumps that keep the work flooded with lubricant are described in a booklet that has been published by the Ruthman Machinery Co., Front and Pike Sts., Cincinnati, Ohio.

**Equipment For the Shop:** Vises for the bench, drill press, milling machine or shaper; angle plates; adjustable clamps, jacks and other tools for the machine shop, are described and illustrated in a booklet that is





## "Nicholson" Flexible Couplings

are recommended for motor driven equipment—  
guaranteed to stand up on the most severe drives.  
All steel—heat treated and lubricated.

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**W. H. NICHOLSON & CO.**

136 Oregon Street

WILKES-BARRE, PA.

## Columbia TOOL STEEL

CLARITE HIGH SPEED STEEL

OILDIE NON-SHRINKING

COLUMBIA SPECIAL CARBON  
TOOL STEEL

COLUMBIA EXTRA, ETC.

*It pays to use  
Good Tool Steel.*

**COLUMBIA TOOL STEEL COMPANY**

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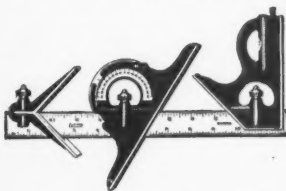
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Micrometers, Calipers, Combination Sets,  
and Gauges of many kinds. Exclusive fea-  
tures and unexcelled accuracy characterize  
these tools.

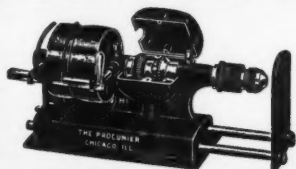
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SMALL TOOL DIVISION

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## ANY TAPPING PROBLEMS?



Whether tap breakage or imperfectly tapped holes, a

### PROCUNIER BENCH TAPPER

will solve them. It has bronze bushings, a real safety  
device, and tap holder, and all hardened reverse gears.

No. 2—7/16" in steel, with friction, \$49.00, without, \$41.00

No. 3—5/8" in steel, with friction, \$55.00, without, \$46.00

We also make safety tapping attachments for drill  
presses, and quick change tap and drill chucks.

**PROCUNIER SAFETY CHUCK CO., 12 So. Clinton St., Chicago, Illinois**

published by the Sheldon Machine Co., 3253-55 Cottage Grove Ave., Chicago, Ill. Copy free upon request.

**Economies in Material Handling:** A volume of facts about planned load handling, with actual examples of economies in time, material, and labor costs that have been effected with Shepard electric hoists will be sent free upon request to Shepard Niles Crane & Hoist Corp., 424 Schuyler Ave., Montour Falls, N. Y.

**Rapid Drill Jigs:** How time can be saved and drilling operations made easier by the use of a quick-acting drill jig is told in a booklet that is issued free by the Siewek Tool & Die Co., 10230 Woodward Ave., Detroit, Michigan.

**"Metal Cutting"** is the title of the book that describes the latest methods of cutting metals, and includes descriptions and illustrations of both the band saws and inserted-tooth metal-cutting saws made by the Simonds Saws & Steel Co., Fitchburg, Mass. Copy will be sent free upon application to the firm mentioned.

**Simplex Nesting Bins:** Bins which may be used as individual containers, as tote-boxes, or "nested" to form stock-room sections are described in an illustrated circular published by the Simplex Tool Co., Woonsocket, R. I. Copy free upon request.

**The Most Efficient Speed** for the operation of special production units, power conveyors, and other machinery by the use of the WHS Speed Reducer and how it can be obtained is told in a bulletin that will be mailed free by Winfield H. Smith, Inc., 30 Eaton St., Springfield, N. Y.

**A Snyder Tool Set-Up**, consisting of a Snyder ball-bearing multiple head, bushing plate, and work holding fixture, will convert a single spindle drill into a multiple drill at small cost. Particulars upon request. Address Snyder Tool & Eng. Co., 3400 E. Lafayette Ave., Detroit, Michigan.

**Accurate Gages Speed Production:** The complete line of snap, plug, ring, pin, dial indicator, and special gages made by the Standard Gage Co., Inc., Poughkeepsie, N. Y., is described and illustrated in Catalog No. 4, which can be had without charge by addressing this firm. Johansson gage block sets and accessories are also listed in this book.

**Machinists' Tools and Gages:** Catalog No. 24, issued by the L. S. Starrett Co., Athol, Mass., describes and illustrates the complete assortment of machinists' fine tools and gages made by this firm. Copy free upon request.

**Flexible Shaft Equipment:** The uses of the flexible shaft for drilling, grinding, and other operations is discussed in a booklet which also describes and illustrates the flexible shaft equipment made by N. A. Strand & Co., 5001 N. Lincoln St., Chicago, Ill.

**Rigidmilling Principles and Practices:** A book that shows how the Rigidmill can be adapted to various kinds of usual and unusual milling operations, and which describes in detail the work that can be handled by this machine has been issued by the Sundstrand Machine Tool Co., Rockford, Ill. Copy free upon request.

**Snap, Plug, Ring, and Thread Gages:** The complete line of precision gages made by The Taft-Pelree Manufacturing Co., 32 Mechanic Ave., Woonsocket, R. I., is described in a folder which can be obtained, free, by addressing this company.

**Penetrating Oil for High-Speed Equipment:** Three-In-One Oil, blended scientifically from animal, mineral and vegetable oils, will penetrate the tightest bearings and lubricate high speed units perfectly. Full information can be had by writing Three-In-One Oil Co., Dept. 96, 130 William St., New York, N. Y.

**Check With Air:** How time and labor can be saved by the use of air-operated chucks, cylinders, and other equipment is told in a book which describes "Hopkins" Air-Operated Equipment. Published by The Tomkins-Johnson Company, 620 N. Mechanic St., Jackson, Mich. Sent free upon request.

**Save Cutting Oil:** How cutting oil can be separated from chips and thus reclaimed by the use of a centrifugal chip "wringer," is told in a bulletin that is issued free by the Tolhurst Machine Works, Troy, N. Y.

**A Simplified and Improved Drive Control for Machinery:** Two distinct types of plate clutches that have proved successful highly in the driving mechanism of machine tools are described and illustrated in a bulletin that will be sent free by the Twin Disc Clutch Company, Racine, Wis.

**Multiple Drilling With a Single-Spindle Drill:** Methods by which multiple drilling may be done on a single-spindle drill, using multiple spindle drill heads, are discussed in a bulletin that is issued by The United States Drill Head Co., 1954 Riverside Drive, Cincinnati.

**Electrically-Driven Portable Tools:** The "U. S." line of electric drills, die grinders, electric screw drivers, surface grinders, tool post grinders, and bench and floor grinders is described in Catalog No. 24, which has been published by The United States Electrical Tool Co., 2471 W. Sixth St., Cincinnati, Ohio.

**Eliminate Clamping Time:** Work can be held without clamps on grinders, planers, and other machines by the use of Walker Magnetic Chucks that are described and illustrated in a series of folders that have been issued by the O. S. Walker Co., Inc., Rockdale St., Worcester, Mass. Copies free upon request.

**Accuracy in Thread Production:** How accurate threads can be produced by the thread miller is told in a pamphlet that can be obtained free by addressing the Waltham Machine Works, Box 296, Waltham, Mass.

**Tool Chests for Machinists and Toolmakers:** The complete line of fine tool chests for machinists and toolmakers made by J. M. Waterston, 420 Woodward Ave., Detroit, Mich., is described in Catalog No. 25. Ask for it.

**Casler Offset Boring Heads** with micrometer adjustment will reduce costs, save time, and promote accuracy in boring jigs, fixtures, or experimental work. Catalog free upon request. Address Westcott Chuck Co., 121 E. Walnut St., Oneida, N. Y.

**Screw Machine Products:** Full information as to the manufacturing service on screw machine products maintained by Western Screw Products Co., 19-31 St. George St., St. Louis, Mo., will be sent upon request.

**Wetmore Adjustable Reamers:** The exclusive features of the Wetmore Adjustable Shell Reamer are discussed in Catalog No. 29, issued by the Wetmore Reamer Co., 62 27th St., Milwaukee, Wis. Copy free upon request.

**Change Punches Without Removing Die:** The user of Hercules Interchangeable Punches and Retainers can change punches without removing the die from the press. Information that will help to lower die-building costs, reduce lost time for repairs, and increase press production can be had by addressing Whitman & Barnes, Inc., Detroit, Michigan.

**Whiton Steel Body Lathe Chucks:** The various types and sizes of steel body chucks for lathes that are made by the D. E. Whiton Machine Co., New London, Conn., are described and illustrated in a booklet that will be sent free upon application to this firm.

**Wrenches For Every Use:** "Guaranteed Against Breakage" tappet wrenches, pipe and fitting tongs, offset wrenches, and wrenches for all other uses are described and illustrated in a series of folders which can be obtained without charge by addressing J. H. Williams & Co., Buffalo, N. Y.

**"An Inspection Tour of Industrial Plants"** is a booklet published by Wilson-Maclean Co., Inc., Concord Ave. & 143rd St., New York, N. Y., showing the heat-treating equipment in use in a number of industrial plants, and discussing the manner in which such equipment is automatically controlled. Copy free upon request.

## GROBET SWISS FILES



Grobet Slotting Files are specially designed and constructed for slotting mica off commutators. They are extremely hard and durable, and fast cutting.

Other specialties: Diemakers Rifflers, Files for filing machines—Illinois, Hartford, Oliver, Thiel, Excell, etc. Complete stock is on hand to meet your requirements.

GROBET FILE CORP. of America

3 Park Place, New York City.

## MACHINISTS AND TOOL-MAKERS TOOL CHESTS



Tool Chests that are right in construction and price.

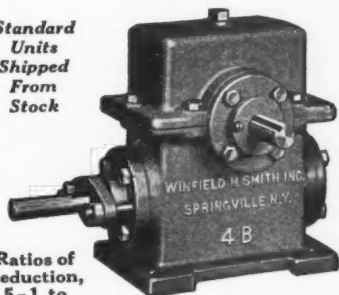
Send for No. 25 Catalogue of Tool Chests and Tools.

## WATERSTON'S

420 Woodward Avenue  
DETROIT, MICH.

## WHS Speed Reducers

Standard  
Units  
Shipped  
From  
Stock

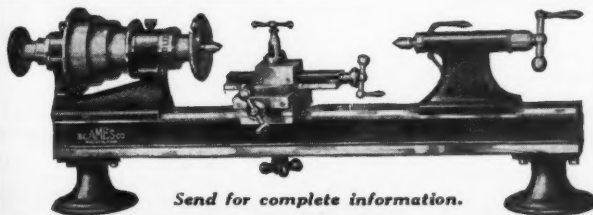


Ratios of  
Reduction,  
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Winfield H. Smith, Inc.

30 EATON ST.  
SPRINGVILLE, ERIE CO., NEW YORK



Send for complete information.

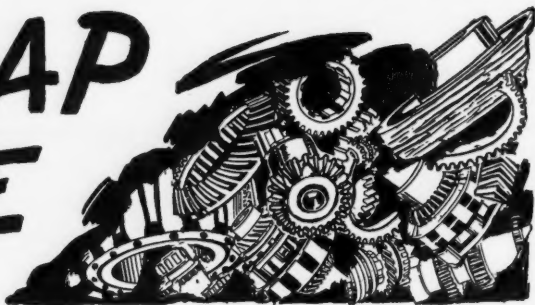
## AMES Bench Lathes

For Turning—Drilling  
Grinding—Milling—  
Threading—Filing—  
Polishing—in the tool  
room or in production.

**B. C. AMES COMPANY, Waltham, Mass.**  
DETROIT BRANCH: 902 STEPHENSON BUILDING

# THE SCRAP PILE

By GEO. ALEXANDER MANN



## A Good Suggest

"You're all the time topping,"  
The caddy said to Brown,  
"Why don't you try turnin'  
Your golf ball upside down?"

Dad says you can tell whether a man  
has loved and lost or loved and won  
by the size of his pocketbook.

## Aw Hush

The copper's hip bulged—  
The chief yelled "stop"—  
An' what they found  
Was "corn on the cop."

One o' the best we've heard lately is  
the one about the guy who bragged  
that he expected to be on earth at  
least a year because he went to twelve  
doctors an' each gave him a month to  
live.

## Animated Grover

He's the laziest chef,  
Gotta hand it to Grover,  
Puts pop corn in hot cakes,  
So they'll turn 'emselves over.

Some men who boast of "open  
minds" give us the impression that  
everything's dropped out.

'Tis said some o' the farmers are  
now using radio speakers instead o'  
scarecrows—considerin' some o' the  
radio programs inflicted on the air  
these days would say they oughta  
be arrested for cruelty to crows.

## The Idea

They oughta hang that guy Bill Jones,  
To let him live's a sin,  
When his new baby came he tried  
To turn the old one in.

## There's a Reason

With the new dial phones there'll  
be more wrong numbers than ever but  
less belly achin'.

## You Said Ut

The chances are that the man who  
marries in haste ain't goin' to repent  
at leisure 'cause there ain't goin' to  
be no leisure.

A bachelor is a guy who never  
learned to concentrate.

If there's anything worse than a  
loose bolt it's a tight nut.

With clubs as with individuals the  
most exclusive are the dullest.

## Ain't Ut Tha Troof?

The prices o' necessities,  
Are up I been thinkin'  
An' mos' the dern stuff  
Is hardly worth drinkin'

The flapperettes are so strong on  
marrying for money, Cupid's only  
chance is to shoot 'em with a Pierce-  
Arrow.

When they want a long vacation  
with pay they run for city council.

## Drill Around Corners

WITH A

## Koza Right Angle Drill

WHEN it is necessary to put in a hole or drill out a broken bolt in a hard-to-get-at-place—a Koza Right Angle Drill or Grinder will prove itself worth its weight in gold.

Koza Right Angle Drills and Grinders eliminate the necessity of tearing down a machine, to reach the broken bolt or part, by drilling around the corner—at right angles.

These tools may be used for drilling, keywaying or countersinking. There is a tool for every requirement—in every industry.

Write for Bulletin

**CHAS. A. KOZA**

464 AUGUSTINE STREET  
ROCHESTER, N. Y.

## SET SCREWS

## NUTS

## HEX. HD. CAP SCREWS

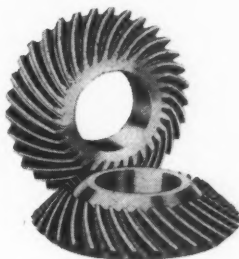


Send us your blue prints or samples of special screw machine work for estimate.

**WESTERN SCREW-PRODUCTS CO.**

1931 St. George St. St. Louis, U.S.A.

# CINCINNATI GEARS



## Are Dependable!

Whenever you order a CINCINNATI GEAR you can *depend* upon getting a gear that will meet your most rigid requirements and specifications.

Such *dependability* is assured because every CINCINNATI GEAR is accurate in size, true in form, and correct in pitch.

Try them!

**The Cincinnati Gear Co.**

1825 READING ROAD

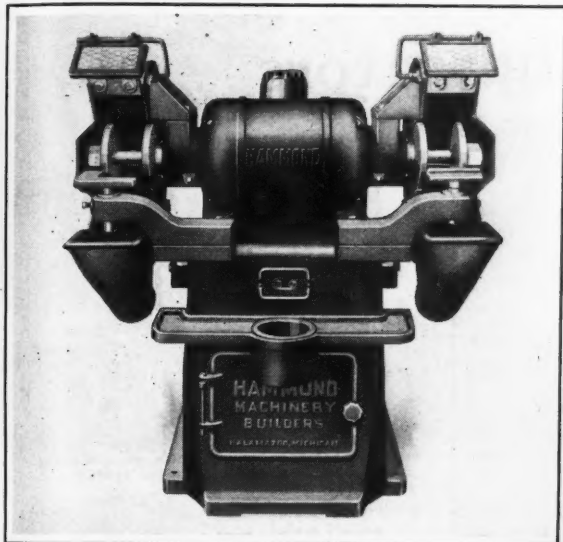
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Illustrating Type W,  
5 H. P. Production  
Grinder.



## The Motor Air Cleaner

Distinguishes the

When metallic dust, emery and chips try to occupy the space that was provided for air gap in your Electrical Grinders and Polishers, there is bound to be an expensive shut down sooner or later. Motor Air Cleaner discharges this material before it enters the motor windings, resulting in a clean, cool operating unit. For complete details, request bulletin 20.

**HAMMOND**  
of KALAMAZOO

**GRINDERS  
&  
POLISHERS**

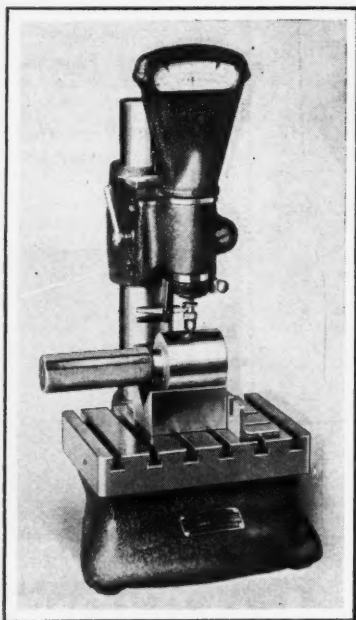
Bench and Pedestal Grinders for tool grinding, production work, snagging, disc grinding, etc. Polishing and Buffing Lathes in a complete variety of types and sizes.

*Hammond Machinery Builders*  
INCORPORATED

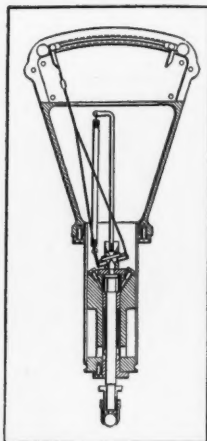
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KALAMAZOO, MICHIGAN

# Use Swiss Micro-Indicators



for  
High  
Precision  
Measure-  
ments



*Cross Section of Swiss  
Micro-Indicator showing  
knife-edge multipli-  
cation system.*



**T**HESE Micro-Indica-  
tors made by the  
Societe Genevoise, man-  
ufacturers of the Swiss  
Jig Bore, measure ac-  
curately to 1/10,000  
inch or better.



See this and another  
new Micro-Indicator  
Support at our Booth  
No. 14, at the Nation-  
al Metals Exposition,  
at the Stevens Hotel,  
Chicago, September  
22 to 26, 1930.

Supplied with vari-  
ous supports for  
internal and exter-  
nal measurements.



## THE R. Y. FERNER COMPANY

*U. S. and Canadian Representatives*

1127 INVESTMENT BLDG.

WASHINGTON, D. C.

DO NOT  
SOCK  
prizes  
socks  
7-16"  
11-16"  
and  
Price

DO NOT  
SOCK  
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gon so  
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offset,  
and sli  
5" an  
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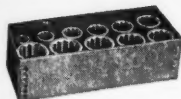


# "They Make the Tough Nuts Easy"



**DOUBLE HEXAGON SOCKET SET No. TD—**  
Contains 5 double hexagon sockets  $\frac{1}{2}$ " to  $\frac{5}{8}$ " inclusive—an offset handle, universal joint, 12" T handle and 6" extension.  
Price - - - - - \$3.30

## BONNEY "CV" Chrome-Vanadium WRENCHES



**DOUBLE HEXAGON SOCKET SET No. G—**Comprises 11 double hexagon sockets on the following sizes: 7-16",  $\frac{1}{2}$ ", 9-16", 19-32",  $\frac{5}{8}$ ", 11-16",  $\frac{3}{4}$ ", 25-32", 13-16",  $\frac{7}{8}$ " and 15-16".  
Price - - - \$8.05



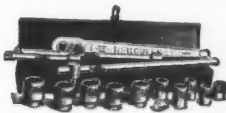
**DOUBLE HEXAGON SOCKET SET No. RD—**Composed of 10 double hexagon sockets from 7-16" to  $\frac{1}{2}$ " (excepting 21-32") inclusive, offset, ratchet, 6" and 12" T and sliding T, Brace, Speeder 5" and 10" extension and universal joint.  
Price - - - \$29.85

**BONNEY \*CV Sockets** are made from Chrome Vanadium steel making them light in weight and with unbreakable strength. The tremendous strength allows refinement of design both in shape and thickness of socket wall. They provide a reasonable depth and the outside diameter is reduced to permit greatest possible clearance in operation.

Like all Bonney \*CV Chrome Vanadium Wrenches, they are guaranteed not to break or spread and any wrench will be replaced free of charge, that does not stand up to this guarantee.



**DOUBLE HEXAGON SOCKET SET No. WD—**Composed of 10 double hexagon sockets, 7-16" to  $\frac{1}{2}$ " (excepting 21-32") inclusive, brace, ratchet, sliding T, 5" and 10" extension and universal joint.  
Price - - - \$21.00



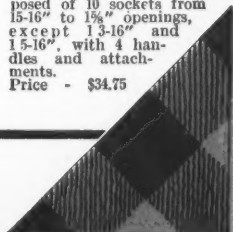
**HEAVY DUTY SOCKET SET No. H—**Designed for extremely hard service. Composed of 10 sockets from 15-16" to 19" openings, except 13-16" and 15-16", with 4 handles and attachments.  
Price - \$34.75

\*CV is a Bonney trademark registered in the U. S. Patent Office

**BONNEY FORGE & TOOL WORKS**  
ALLENTOWN, PA.

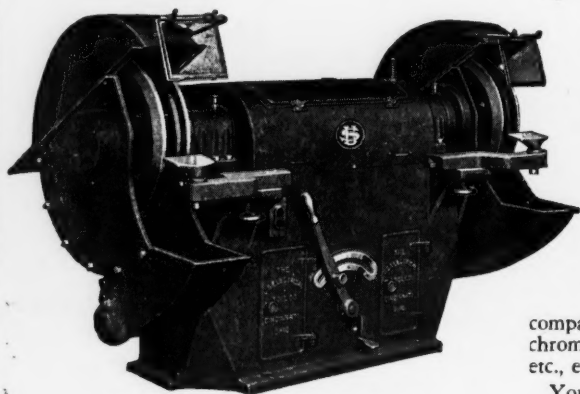
Makers of Special Service Wrenches of Chrome Vanadium, Carbon Steel Drop Forged Wrenches, Pipe Wrenches, and Drop Forgings  
*Patents Pending*

Chrome Vanadium registered August 11, 1925





**[I]T'S** setting new records,  
this grinder — the only  
one made that maintains  
such constant wheel sur-  
face speed clear down to  
the flanges. Even in high  
speed snagging at 9,000  
surface feet per minute!



Pat. No. 1477052. Other Pats. Pend.

**BUFFERS, TOO**— This drive is also obtainable in U.S. Multispeed Buffing and Polishing Machines—providing four different wheel speeds from 2,000 to 3,000 r.p.m.

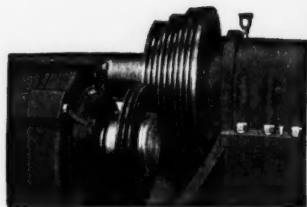
## **The UNITED STATES ELECTRICAL TOOL CO.**

*Oldest Builders of Electric Drills and Grinders in the World*

2471 WEST SIXTH STREET

CINCINNATI, OHIO

Canadian Division — MAPLE LEAF ELECTRICAL TOOLS, Ltd.—TORONTO



### **U. S. Variable Speed A. C. Grinder**

**I**NCREASED production! Better finished results! Lower costs! These and other advantages are being obtained with this grinder. The Gibbs V-Disc Transmission of GRAPHITIZED MICARTA is one of the reasons why. Impartial tests prove it highly efficient. It's free from slip or back lash—positive in action—durable—easy to operate—easily accessible—quiet—low in replacement cost. Runs on **ALTERNATING CURRENT**.

### **Six Ball Bearings**

The whole grinder embodies most up-to-date features for safe, economical, dependable operation and long life. It includes SIX heavy duty SKF Ball Bearings in dust-proof compartments—heavy one-piece chrome manganese steel shaft—etc., etc.

Your distributor can supply you, or write us direct today.